The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. X. No. 244 FEBRUARY 16, 1924 Prepaid Annual Subscription United Kingdom, £1.1.0; Abroad, £1.6.0.

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NOTICES.—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

The prepaid subscription to THE CHEMICAL AGE *is 21s. per annum for the United Kingdom, and 26s. abroad. Cheques, Money Orders and Postal Orders should be made payable to Benn Brothers, Ltd.*

Editorial and General Offices—8, *Bouverie St., London, E.C.4*
Telegrams: "Allangas, Fleet, London." Telephone: City 9852 (6 lines)

Encouraging Prospects

THERE are many material inferences to be drawn from a study of the annual financial and trade review which *The Times* published on Saturday last. Nearly all those particular industries with which the technical chemist is concerned come under the notice of the contributors, and it is instructive to draw parallels between the ups and downs of the closely associated or interdependent trades. If we take, for instance, the iron and steel trade, we find that, measured solely by statistics of production and exports, substantial progress was made during the year. A remarkable fact is that in 1923 the output of pig iron was nearly three times the quantity produced in 1921, and came within 75 per cent. of the peak figures of ten years ago. The effect may be directly traced in the coal industry, in which, in spite of a phenomenal export trade, some considerable expansion in the home demand was experienced. In both industries the Ruhr boom dominated all other market factors in the early months of the year, although there appears to be much difference of opinion as to the actual benefits this country obtained. The sharp upward movement in production in the early part of the year was followed by an equally sharp decline immediately it became evident that, far from bringing a windfall to the British manufacturer, the collapse of the Ruhr was breeding not only political trouble but a general feeling of unsettlement which was destructive of business.

So far as chemical products, and in particular dyestuffs, were concerned the review bears out much that we have had to say with regard to trade conditions. In spite of the advantages enjoyed by competitors in the matter of exchange a great improvement in export figures occurred, and perhaps the most outstanding feature was the fact that British dyestuffs fell in price, on an average, to figures of about 60–65 per cent. of those prevailing in 1922. It was at one time feared that the seizures of dyestuffs made by the French in occupied Rhineland would have a very adverse effect by throwing large quantities of these materials on the world's markets, but, happily, the effect was almost negligible. China and the Far East came in as large purchasers of indigo and vat dyes, while overseas consumers of dyestuffs in general turned to this country whose production was found adequate for their needs. In connection with nitrogen products the situation in the Chilean nitrate industry calls for particular notice, for during the past year the world's consumption of nitrate increased by more than half-a-million tons, with the result that the heavy stocks which had accumulated dropped to nearly half of the figure they stood at a year ago. Prospects in this industry, accordingly, look particularly bright for the coming year. In all sections of trade, in fact, in which the industrial chemist is interested there were, and are, signs that—political and labour dislocations apart—the near future will witness a wave of solid but moderate prosperity, which will be built on far firmer foundations than the artificial booms which proved of such temporary value some three or four years ago.

Overseas Trade in January

THE progressive improvement in overseas trade would appear to have been only slightly, if at all, affected by the political events of the past month. It is, of course, not easy to state what the figures might have been had there been no railway strike, but it may be generally conceded that the advent of the Labour Government has not affected matters at all. The whole trade of the country during January shows a maked increase in imported goods compared with last year, and though there has been a falling off in exports these are slightly better than they were in

December. It must be remembered that a year ago trade, as reflected in the official returns, was in a very fluctuating state, and that the January exports were notably large. Turning to chemicals, there has been a falling off in imports of some £60,000, on a value of just over one million sterling, but again the figure is better than December last by nearly £40,000. Among the imports remarkable increases are shown in the quantities of borax, glycerin, and alizarine dyestuffs. The export trade is usually taken to be a better indication of internal industrial conditions, and it is satisfactory to note that the improvement which set in some months ago in the chemical trade is still continued, although perhaps to a slightly less extent. The January figure of £2,400,000 represents an increase of between £100,000 and £200,000 on both the December figures and those for January last year. British synthetic dyes continue to be exported in increased quantity, and very satisfactory exports have been made of sulphate of ammonia, benzol, naphtha and some other coal tar products, while potassium compounds are a new feature with a distinctly increased export. On the whole there is little reflected in the official returns that is unfavourable, and a number of points which give cause for satisfaction.

Chemists and Modern Warfare

In an address to the students of the Northern Polytechnic Institution on Tuesday, Major V. Lefebure, of the Chemical Warfare department, brought out more than one interesting point with regard to the position of the chemist in the event of possible wars in the future. As is well known, Major Lefebure is strongly convinced that, given freedom of weapons in warfare, the side which is best equipped chemically will be overwhelmingly in a position to achieve a rapid decision. There is very good reason to suppose that this may be the case, especially when it is remembered that there is even now, after six years of investigation under peace-time conditions, no effective antidote against either mustard gas or the organo-arsenic compounds used in the last war. This is one of the facts which is not realised by the general public, and Major Lefebure from time to time has made a special point of bringing the importance of chemical warfare to the public notice. There is unfortunately as marked a public apathy to this question as to many others of a scientific nature in this country, but an unexpressed public feeling exists on the matter which is largely to the effect that the indiscriminate use of the chemical weapons, with the appaling results it may have on its victims, should be effectively restricted or totally prohibited.

The chemist, as a matter of fact, holds a key position in the question of restriction of chemical warfare as much as in its encouragement. It is customary for scientists to dismiss matters of this kind as affairs of the public conscience, while the public leaves them to the Government, and the Government is usually too busy with matters which are of more immediate importance. Actually chemists could do much, and at the best a government cannot tackle the whole problem. Chemical warfare requires work in at least three directions, research, industrial production and suitable methods of application. The last named only is directly under Government supervision, and as such is capable of control by international agreement, through the League of Nations or otherwise. It would hardly be possible for a nation to carry out secretly the development of any new chemical weapon; such work requires too great an area. Research and industrial production are, however, so intimately bound up with normal life in peace-time that they are only capable of control from within, and the chemist is the only person capable of exercising this control. Apart from the suggestion previously made elsewhere that chemists should agree internationally not to work in any way on chemical warfare problems—a somehwat visionary idea owing to the lack of any suitable organisation—it should be possible for members of the various scientific bodies in this country to consider the possibility of constructive proposals to prevent work by scientists on poison gas for war purposes. This would be a real step towards the disarmament policy which the Government is pledged to support under the Washington Conference. One of the reasons that this policy has made so little progress is that there have been so few practical proposals, which are being repeatedly asked for by the international bodies concerned. If such a scheme could be drawn up, the matter could be submitted to other nations for mutual arrangement, but if there is no such scheme there is nothing on which to negotiate an agreement.

Blended Motor Fuels

From time to time various fuel blends have been suggested and tried out for internal combustion engines, not so much with the view of substitution for, as blending with, petrol so as to make available a fuel efficient in operation and cheaper in price than pure petrol. The most favoured blends are petrol-benzol, petrol-kerosene and petrol-ether. So far the blended fuel has shown no advantage over pure petrol, though it has been claimed that a mixture of petrol and benzol, for instance, will enable an engine to develop more power than when on straight fuel; but this claim has not been borne out in practice. In fact, it has not been demonstrated that any mixture of petrol, benzol, kerosene or ether will give such continuously reliable results as pure petrol. A liquid which has been suggested as the most suitable blend for petrol is acetone. Acetone has a heating value of 89,500 B.Th.U. against ethyl alcohol at 86,000 B.Th.U. It has a low boiling point (133° F.), which means that it will facilitate engine starting; it promotes steady engine operation because of its homogeneity; and it has a low freezing point — 138° F. So far tests on acetone show that it can be used in an engine with a compression ratio of 7 : 1, that it burns smokelessly, that it does not deposit carbon. It has also been ascertained that acetone is easily mixed with any of the fuels used for internal combustion engines, and that it tends to prevent fuel knocks when mixed in small quantities with the heavier hydrocarbon fuels. These few facts in connection with acetone may prove helpful to those of our readers who have expressed interest in the matter of its utilisation for blending, and we shall, of course, be glad to know of any particular experience which other readers may have had.

Training the Chemical Engineer

OF what should the training of a chemical engineer consist? What must he know when he sets out from his university or technical college to take his place in the chemical industry? When asking this question it is well to remember that chemistry is a widening science, that the old methods of training a chemical engineer will not do, and that those establishments which educate the young engineer and prepare him for future utility to the State must keep abreast of modern development and the present-day tendencies not only towards specialisation but also towards the enlargement of the engineer's scope of service to the public. It is, of course, obvious that every engineer must be thoroughly trained in the application of scientific theory and book learning to the problems of every-day engineering operations. That is to say, his book learning must be thorough, and when he is finally turned out of this educational institution as a product ready for the market he must possess at the very least an elementary knowledge of the application of his theories. The scientist is concerned only with basic facts and theories and with the development of new designs and processes. It is the engineer's task to adapt and mould these theories and developments in the design of a machine, the erection of a plant, or the flowsheet of a process.

This knowledge of the specialised branch of his profession is naturally the most important to the young chemical engineer, and probably the next essential in his training is a sound grounding in the fundamental facts and fallacies of economics. He must understand such forces as demand and supply, production, rates and methods of payment, markets, and such developments of these forces as hours of work, industrial fatigue, incentive and the effect of these factors on production. As a corollary to this the engineer should be thoroughly acquainted with costs of materials, costs of production, and operating expenses. In other words, he must know just how to do for one shilling what the man without a knowledge of costs could do for two shillings. These aspects of the engineer's training are essential to his efficiency, but there are others which will always stand him in good stead in any position he may be called upon to fill.

He must know how and where he can improve and rub up his theory, which in the best of us becomes rusty after a time. Libraries should be thoroughly familiar to him, and he should know exactly how to locate a subject, a book or a formula in that book. This is a great asset and cannot be over-cultivated. He must also know which of the technical journals are of value to him and just how to use the information they provide. Naturally, all these qualifications cannot be provided for by technical institutions, though they could no doubt do much to improve the intellectual equipment of the graduated engineer. The majority of such qualities can only be acquired and developed by observing and reading thoroughly and widely, and in this way only can the young chemical engineer hope to fit himself for one of the most interesting professions in the world.

Points from Our News Pages

Mr. A. Chaston Chapman, in an address to students at the Borough Polytechnic, dealt with some of the necessary factors for personal success in industrial chemistry (p. 157).

Major Lefebure made a strong plea for broader vision on the part of chemists as to the future national importance of their work at a meeting of the Northern Polytechnic Chemical Association (p. 158).

The Royal Commission on Awards to Inventors has recommended that no award should be made in connection with the mustard gas claim by Dr. Levinstein and Professor Green (p. 158).

A Diagram is published illustrating the uses of sulphuric acid in chemical industry (p. 162).

According to our London Market Report, trade has been fairly active during the week, and the tendency of prices has been upward (p. 176).

Business in the Scottish Chemical Market has remained quiet during the past week (p. 179).

Books Received

THE VEGETABLE PROTEINS. By Thomas B. Osborne. London: Longmans, Green & Co. Pp. 154. 9s.

CHEMICAL SYNONYMS AND TRADE NAMES. By William Gardner. London: Crosby, Lockwood and Son. Pp. 280. 25s.

ORGANIC SYNTHESES. Vol. III. By Hans Thacher Clarke, Editor-in-Chief. London: Chapman and Hall, Ltd. New York: John Wiley and Sons, Inc. Pp. 104. 7s. 6d.

DIFFERENTIAL EQUATIONS IN APPLIED CHEMISTRY. By F. L. Hitchcock and C. S. Robinson. London: Chapman and Hall, Ltd. New York: John Wiley and Sons, Inc. Pp. 110. 7s. 6d.

The Calendar

Feb.		
16	British Association of Chemists (London Section): 3rd Annual Dinner.	Engineers' Club, Coventry Street, London, W.1.
16	North of England Institute of Mining and Mechanical Engineers. General Meeting. 2 p.m.	Newcastle-upon-Tyne.
18	Institution of Chemical Engineers: "The Transport, Storage and Distribution of Hydrochloric Acid." D. M. Newitt. 8 p.m.	Engineers' Club, Coventry Street, London.
18	Faraday Society: "A Magnetic Theory of Valency." Principal A. P. Laurie. 8 p.m.	Burlington House, Piccadilly, W.1.
18	University of Birmingham Chemical Society: "Vitamins: their Chemistry and Importance to Life." G. E. Forstner.	The University, Birmingham.
19	Hull Chemical and Engineering Society: "The Manufacture and Testing of Portland Cement." Miss D. J. Butterfield. 7.45 p.m.	Hull Photographic Society's Rooms, Grey Street, Park Street, Hull.
20	Society of Glass Technology.	Sheffield.
20	Society of Chemical Industry (Nottingham Section): Papers by S. R. Trotmon and R. W. Sutton. 7.30 p.m.	University College, Nottingham.
21	Royal Institution of Great Britain: "Crystalline Structure of Organic Substances" (Lecture III). Sir William Bragg. 5.15 p.m.	21, Albemarle Street, London, S.W.1.
21	Chemical Society: Ordinary Scientific Meeting. 8 p.m.	Burlington House, Piccadilly, W.1.
21	Society of Chemical Industry (Birmingham and Midland Section): "A New Determination of the Specific Gravity of Solutions of Ammonia." N. J. Price and C. S. L. Hawkins. 7.15 p.m.	The University, Birmingham.
22	Society of Chemical Industry (Manchester Section): Joint Meeting with the Liverpool Section: "Plant Pigments." Professor I. M. Heilbron. 6 p.m.	The University, Liverpool.

Industrial Chemistry as a Career

Mr. Chaston Chapman's Advice to Students

MR. A. CHASTON CHAPMAN, F.I.C., F.R.S., President of the Institute of Chemistry, presented the prizes to the students of the Borough Polytechnic Institute on Friday, February 8, and afterwards delivered an address. Mr. Clifford Highton presided.

Success

After some remarks on examinations and prize-winning Mr. Chaston Chapman dealt with the meaning of success. He said he placed the respect and esteem in which a man was held by those who knew him best and those with whom he worked as the main measure of his success, and any man who was really successful in this best sense was not likely to be wanting in the more material rewards of his industry. Among the more important factors making for success in life he placed a man's love of his work first. Every year the pace grew faster and the pressure greater, and unless a man really had this love he was not likely to put his best into his work or to lead the laborious and strenuous life necessary to ensure success. During his own student years and ever since he had rarely worked less than 10 to 12 hours a day, and no man who desired to be successful could afford to count the hours or to watch the clock. His next advice to them was "look after your health." Success to-day, whether in any career—professional or other—involved a heavier and more continuous physical strain than ever before, and only the strong and healthy man could stand it.

The Value of Tact

At the outset of their careers of all the many personal qualities which made for success none would stand them in better stead than *tact*. He meant those personal qualities which put them on good terms with those who might be in a position to influence them in future, and which sometimes contributed as much as intellectual accomplishments to the attainment of position and success. It was knowing when to keep silent, even under provocation, and when to speak. "Never," he said, "look down on the purely practical man who does not happen to have your scientific or technical knowledge. The man who has built up a big and successful business, even though he may not have had your opportunity of attending classes, is clearly no fool, and he may quite well know a great deal that you have yet to learn. When you go into the works or factory, whether as chemists, engineers, or in some other technical capacity, do not attempt to teach the manager or process foreman his job merely because you have enjoyed the advantage of attending classes and lectures and have, perhaps, spent some time in laboratory study. Learn all you can from the practical man, listen with respect—even if you differ—to what he has to tell you, and then gradually and tactfully introduce some of your own ideas. In this way you will avoid friction, and you will find that everyone is willing to listen to you and to give your ideas a friendly trial."

With regard to personal conduct, or what in a profession was known as etiquette, a volume might be written, but in the end it could probably all be summed up in the injunction —"play the game all the time, not merely for your own hand, but for the team, and observe the golden rule."

Chemists' Prospects in Industry

I am informed that the number of students taking chemistry courses is increasing, and this is a matter for congratulation, if, as I understand is the case, the great majority of such students are studying chemistry with a view to applying their knowledge in the industries in which they are engaged. It is here that I feel that I ought to utter a note of warning. At the present moment, and probably for some time to come, the prospects of a young man taking up chemistry as a profession are not by any means encouraging. The supply of qualified chemists exceeds the demand, and there can be no satisfactory absorption of the surplus until the present period of industrial and commercial depression ends, and the trade revival to which we all look forward sets in. Unless, therefore, a young man has so strong a love of the subject that nothing will turn him from it, and is prepared for much hard work and a great deal of self-sacrifice, he should choose some other calling.

That, however, is quite a different matter from the study of chemistry as a subject necessary for the understanding of and efficiency in almost every branch of industry. Of all subjects I think that chemistry is in many ways the most wonderful. As an educational subject and as a necessary part of a cultured man's equipment it must occupy a high position, for no man can be considered even decently educated unless he has some elementary knowledge of the physical nature of the world in which he lives, and of the universe of which it is a tiny part. As a creator of material wealth nothing can compare with chemistry, and I think we shall all agree that it is much more important at the present time to increase the wealth of this country and of the world than to quarrel about the distribution of the seriously diminished amount which the war has left us.

Now this increase of wealth is obviously dependent upon productive industry, and it is here that the enormous importance of chemistry is borne home even to the least thoughtful among us. It is no exaggeration to say that in most industries the chemist is what the main spring is to the watch, and there are very few manufactures which could be carried on successfully for a day without his help and control. When we realise that metals and alloys, the heavy chemical industry, agriculture, oils and fats, glass, pottery and refractories, dyes, explosives, illuminating gas, rubber, leather, textiles, brewing and distilling, paints and varnishes, photographic materials and pharmaceutical products, to mention only some of our industries, are based on and entirely dependent on chemical science, then I think it will be agreed that not even the greatest enthusiast among us could very well exaggerate the importance to industry of this great branch of human knowledge.

At one time this country was in the happy position of having the markets of the world at its feet; rule-of-thumb held the field and innovations were looked askance at; but to-day it is clearly recognised that every nerve must be strained to the utmost if we are to hold our own with the ever-increasing competition, and those manufacturers who make the fullest and the best use of the great wealth of chemical talent which is available in this country will stand the best chance of surviving in the intense struggle for existence which is going on around us. Happily our leaders of industry are becoming increasingly alive to this aspect of the matter, and it will be found that those who have met with the greatest measure of success and have built up the biggest businesses are those who have shown the most intelligent and the most active appreciation of the assistance which chemistry can render them.

Chemistry in Agriculture

The connection of chemistry with our greatest industry —agriculture—is obviously of the closest description, since the world's production of food depends to a very great extent on the application of manures or fertilisers—chiefly nitrogenous in character—which are absolutely essential for the growth of the plant. The existence, therefore, of an adequate supply of nitrogen in the right form is a matter of supreme importance to the agriculturist and to the world at large. In addition, nitrogen is an essential constituent of almost all the modern high explosives and propellants used in war, so that here again a nation might quite easily find itself dependent for its very existence upon an adequate supply of nitrogen in the form of nitrates or ammonium salts. Before the war considerably more than half of the nitrate required by the world for agricultural and industrial purposes was obtained from Chile in the form of naturally-occurring nitrate of soda, and when it is remembered that in the year 1913 two and a half million tons of Chile nitrate were used, it will be realised that the supply of this natural material must sooner or later come to an end. Although the earlier predictions as to the exhaustion of the South American nitrate beds have been shown to be incorrect, there can be no doubt that at some—not very distant—period the supply of natural nitrate will give out, and agriculture and other industries will be largely dependent upon the nitrogen obtained from the atmosphere. The enormous quantity of atmospheric nitrogen so available

will be apparent when it is realised that the air over a single square mile of land has been calculated to contain about 20 million tons, which is equivalent to more than 30 times the quantity of combined nitrogen contained in the world's production of Chilean nitrate and ammonium sulphate for the year before the war—namely, 1913.

The fixation of nitrogen, which is now carried out on a very large scale, is in many respects one of the most valuable achievements in the field of industrial chemistry, and both for peace and for war the existence of this industry in any country may be of vital importance. In the early part of the war the Germans succeeded, in fact, in solving the problem so successfully that they found it possible to carry on one of the greatest wars known to history, necessitating the consumption of enormous quantities of nitrate without the importation of a single ton of the Chilean product. If, as seems not at all improbable, the production of food should in time become insufficient to supply the needs of the rapidly increasing population of the earth, it will almost certainly be to the chemist that mankind will turn, and perhaps the time may come when the chemist, imitating closely the chemical processes of the living cell, will be able to build up with the aid of this atmospheric nitrogen the complex protein necessary for the nutrition of man and other animals.

Mustard Gas Claim

Process Completely Covered by Patent

As we go to press the recommendation of the Royal Commission on Awards to Inventors is announced in respect of the application *re* mustard gas, and is as follows :—

" The Commission, having inquired into all the circumstances of the case, and being of opinion that the product and the process mentioned in the endorsement on the claim, dated February 18, 1922, are completely covered by Letters Patent No. 142,857, are not prepared to recommend to the Lords Commissioners of H.M. Treasury that any remuneration should be allowed to Dr. Herbert Levinstein, Professor Arthur George Green and the British Dyestuffs Corporation, Ltd., or any of them, in respect of the matters in the said claim mentioned.

" (Signed) T. J. C. TOMLIN,
February 11, 1924. *Chairman.*"

Dyestuff Licences Issued in January

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during January has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee :—The total number of applications received during the month was 441, of which 377 were from merchants or importers. To these should be added 17 cases outstanding on the 1st January, making a total for the month of 458. These were dealt with as follows :—Granted—363 (of which 340 were dealt with within seven days of receipt) ; referred to British makers of similar products—52 (of which 41 were dealt with within seven days of receipt) ; referred to Reparation Supplies available—8 (all dealt with within two days of receipt) ; outstanding on 31st January, 1924—35 (mostly dealt with at meeting of the Committee, held 1st February). Of the total of 458 applications received, 389, or 85 per cent., were dealt with within seven days of receipt.

Birmingham University Chemical Society

AT a meeting of the Chemical Society of the University of Birmingham, held on Monday, February 4, Mr. D. G. Skinner, B.Sc., read a paper on " Glass and its Chemical Nature." The lecturer dealt with the various theories which are held on the constitution of glass, *e.g.*, that glasses are mixtures of simple silicates, the solid-solution theory, and that glasses consist essentially of definite chemical compounds. In connection with the latter the presence of alumina in glasses was discussed. Devitrification and the isomerism of glasses on the basis of the formulæ suggested by Schott and W. and D. Asch were explained. The lecture concluded with a description of the technical manufacture, and reference was made to opaque and coloured glasses.

Chemists and Future War

Major Lefebure at the Northern Polytechnic

MAJOR V. LEFEBURE read a paper entitled " Chemical Vision " at a meeting of the Chemical Association of the Northern Polytechnic Institution, London, on Tuesday. Dr. Drakeley, in introducing the lecturer, said that it was the first occasion on which an old student of the Polytechnic had read a paper before the Association.

Major Lefebure's paper dealt, he explained, with some of the directions in which the chemist might perhaps play a critical part in the future, particularly in the incidence of war or the maintenance of peace. In the short space of half an hour the lecturer touched in an interesting fashion on many points of a controversial nature, and after the paper there was a lively discussion, in which the students asked a number of questions in some cases as to the lecturer's personal opinions on the points raised. The whole meeting was of an informal nature and led to several interesting expressions of opinion.

Apathy Towards Scientific Matters

In his paper Major Lefebure pointed out that there was still among public men a very great ignorance as to the important part played by chemical science in industry and warfare. In the case of the latter, the alarmingly rapid casualty production caused by the German use of mustard gas, and our use of phosgene, had opened the eyes of those in command to the importance of the chemical weapon, but this was due rather to the dangers of the moment than to a sound knowledge of the problem.

There seemed to be some special apathy towards scientific matters shown by educated people in this country. Even now, in spite of what had been learned from the dyestuffs question, there had been very little progress in this country in the case of the most recent organic chemical productions, which really formed a parallel case. He referred to the enormous growth in the United States of the production of synthetic resins and organic rubber vulcanising accelerators. Ten years ago there was no commercial production of synthetic resins, now some 5,000 tons were produced annually in the U.S.A. against a few hundred here, and these were substances with immense commercial possibilities, as they could be moulded to any form, and were afterwards stable towards heat, and were excellent electrical insulators. The position with regard to accelerators was almost parallel as they were developed enormously in the States during the war, while here the production was still comparatively negligible.

Primary Importance of Chemical Warfare

Reverting to the subject of chemical warfare, the lecturer said that if another war were threatened in, say, ten years' time, then if there were a quick decision it would be because of the progress made in chemical warfare ; on the other hand, if disarmament measures were really effective in preventing the war, it would be because the chemist had submitted to restrictions on a hitherto unheard of scale. In any case the chemist held a key position, and it was this fact that was not by any means recognised. From the offensive point of view there was the fact that it was extremely difficult to find an antidote for a new gas ; even after six years of peace-time investigations he did not know that there was any effective protection from mustard gas or organic arsenic compounds. On the other hand, chemical warfare preparations could not be hidden ; the areas in which practice was carried out in the different countries were perfectly well known, and if by arrangement it was decided to abandon chemical warfare, either through the agency of the League of Nations or otherwise, it would not be possible for any nation to achieve much in secret. It took over nine months of the most active preparation during the past war before organic arsenic compounds could be effectively used, and the manufacture of mustard gas presented innumerable technical difficulties, which held up its effective production for a year after it was decided to concentrate enormous sums of money on the work, although the French in that case obtained practical results in four months at one isolated works (the Usines du Rhône, using the bichloride process).

Soda Benzoate as a Food Preservative

By M. Briscoe, B.Sc., A.I.C.

Although it is admittedly difficult to dispense with the use of food preservatives in modern life, their use is now frequently questioned. In this article the writer discusses the use of soda benzoate as a preservative of fruits and acid foods, basing his conclusions on the work of various workers in Germany and the U.S.A.

In discussing preservatives, even scientific men are prone to fall into the error of discussing the preservative divorced from the medium it is intended to preserve. It cannot be too strongly emphasised that there is no such thing as a universal preservative. The action of a preservative is essentially a chemical one, and even an elementary knowledge of chemistry will enable one to realise that a body often functions in a very different chemical manner according to the medium in which it is acting. Some foods are predominantly acid in nature, some alkaline, some sugary, some albuminous—it is unlikely that one and the same body is going to act in the same manner on this diverse range of foodstuffs. This unlikelihood is borne out by research and experiment.

Soda Benzoate and Benzoic Acid

Soda benzoate in itself is not a preservative. It is benzoic acid that is the preserving agent. Benzoic acid, however, is insoluble and is liable therefore to remain in patches either at the top or bottom of the medium or cling to the sides of the containing vessel. This renders even distribution of the preservative uncertain and may produce in portions of the medium a high and undesirable proportion of benzoic acid. Again, benzoic acid is appreciably volatile at the temperature of boiling jams, etc., and would thus be partially lost. Sodium benzoate, however, is soluble, and therefore a homogeneous mixture of medium and preservative is obtained. The acid juices in the fruit or jam liberates the benzoic acid *in situ*, which is thus uniformly and equally distributed throughout the medium. It follows therefore that the use of benzoate of soda is merely a highly convenient method of introducing benzoic acid into the medium and that all literature and references to the value of benzoic acid apply automatically and in equal strength to sodium benzoate.

Media in which Soda Benzoate Acts

In acid media both soda benzoate and benzoic acid have proved remarkably efficient, the higher the acidity the greater the success. In neutral alkaline or albuminous media, however, neither are suitable. Next in order of merit to benzoic acid and its sodium salt come salicylic acid and sodium salicylate. The latter were found to be about 30 per cent. less effective than the former.

In such acid media such as fruits, jams, fruit drinks, etc., it is found that 1·2 parts of soda benzoate per 1,000 function with complete success, and this is a very small proportion. In margarine amounts up to 1 part per 1,000 have been found very effective. In one experiment mildew formation was prevented for 52 days. In sugary media benzoic acid and soda benzoate act strongly in preventing fermentation. Two parts per 1,000 stopped the fermentation of saccharose, 0·2 to 0·25 that of sterilised grape-fruit, 0·3 per 1,000 invert sugar, and 1·2 per 1,000 glucose.

Benzoic acid and soda benzoate are, however, in no way suitable and are not intended for the preservation of meat and albuminous matter, and their use for this purpose is based on ignorance or misapprehension of the true scientific basis underlying their action.

The Natural Presence of Benzoic Acid in Edibles

Though benzoic acid is not found naturally in many foodstuffs eaten by man, it is, however, present to a small extent in the cranberry and to a larger extent in the bilberry. Specimens of the latter have been examined containing 1·36 parts free benzoic acid per 1,000 and also 0·42 parts benzoic acid per 1,000 combined with sugars in the form of glucosides. This makes a total benzoic acid content of 1·78 parts per 1,000. It will be seen that this is considerably above the limit needed for benzoic acid to act as a preservative, and bilberries have been and are consumed by human beings without any deleterious effects whatever. So powerful is the preserving action of benzoic acid that bilberry juice exposed to a continuous current of air only began to ferment after four weeks.

Having found a preservative that is effective for the meduim intended the next question that arises before its use can be actually recommended is whether the preservative is in any way harmful to the health. In investigating this point we have two things to consider :—(*a*) What happens to benzoic acid itself in the body ? (*b*) how does it effect the normal actions and physiological processes of the body ?

The former question can be readily answered. Benzoic acid is completely eliminated by both animals and human beings in the form of hippuric acid $C_6H_5.CO.NH.CH_2.COOH$ which is found in the urine. This is due to the interaction of benzoic acid with glycocoll (amino-acetic acid, NH_2CH_2COOH) in the body. If the amount of benzoic acid taken is too large the reaction in the body is altered, for it is found that the other amino-acids present in the body cannot function similarly to glycocoll and the benzoic acid is liberated either as free acid or as benzoylglycuronic acid. The amounts of benzoic acid used as preservative, however, are of course, so small that they are completely eliminated as hippuric acid. This fact is again and again confirmed by experimenters. Salicylic acid, on the other hand, is not entirely eliminated, and to some extent injures the kidneys.

Wiley's Work

In 1908 the United States Ministry of Agriculture commissioned H. W. Wiley to investigate the effects of benzoic acid on the human system. Wiley performed exhaustive experiments and obtained hosts of figures. He issued his report, which was strongly adverse to benzoic acid and soda benzoate. Wiley's work has since been submitted to a critical analysis of Professor K. D. Lehmann in the *Chemiker Zeitung*. Professor Lehmann does not question Wiley's figures, but he contests the whole basis on which his work is framed and the logic of his deductions from his figures. He shows that Wiley seems to have started with a wholly erroneous conception of the function of a preservative. Wiley seems in fact almost to have expected benzoic acid to act beneficially on the body, Lehmann argues that on no sequence of logical or scientific arguments can one support Wiley's deductions from his figures ; in fact one might as easily form an entirely contrary opinion from Wiley's data. Professor Lehmann is drawn to the conclusion that Wiley and his co-workers started with a preconceived antipathy to benzoic acid. He is supported in his opinion by the fact that the U.S. Ministry of Agriculture itself must have doubted Wiley's work. Otherwise it seems almost impossible to account for the fact that the following year, 1909, they commissioned Ira Remsen to investigate precisely the same subject. Remsen had under him Professor Russell Chittenden of Yale, Professor John Long of Chicago University and Professor Christian Herter of Columbia University.

These three workers performed independent experiments, and in their report they ignore Wiley's work entirely. From a mass of experiments conducted on persons of all grades of intelligence, they individually and collectively pronounce strongly in favour of benzoic acid. They find that doses below 0·5 gm. have no poisonous effect and do no harm to the health whatever ; that doses of 4 gm. affect only the very slightest alteration in the physiological processes of the body. Chittenden goes as far as to say that 4 gm. of benzoate of soda are no more harmful than 4 gm. of ordinary cooking salt.

Later still Dr. Gerlach showed that eighty-eight consecutive daily doses of 1 gm. of benzoic acid had no influence on the health or the bodily weight, and all these figures are utterly beyond the amount that could possibly be consumed as a preservative.

The Position of Soda Benzoate To-day

In 1919 Professor Abel of Jena, summarising the work done on soda benzoate, showed that if the use of this preservative is confined to those foods for which it functions, then the total amount consumed would be very small. He estimated that no normal person would consume more than 100 gm. of jam or preserved fruits per diem, *i.e.*, 0·12 gm. of preservative. If one also allows a similar consumption of margarine also

preserved with soda benzoate then the total amount of preservative consumed falls far short of 0·5 gm. per day and this quantity has been shown to be absolutely harmless.

To-day in Germany the subject of soda benzoate is regarded as one that needs no further investigation. The efficiency and harmlessness of soda benzoate is recognised as a scientifically demonstrated fact, and the Government authorities regard with favour the use of soda benzoate in preference to other preservatives for the type of media enumerated. Similar views are held in Austria, Holland and Denmark.

Chemical Engineering in Gasworks

Possible Future Developments

MR. W. A. TWINE, A.I.C., M.I.M.E. (Superintendent of Chemical Plant of the Birmingham Gas Department), read a paper on "Chemical Engineering in Modern Gas Works Practice," at a meeting of the Midland Junior Gas Association at the Council House, Birmingham, on Friday, February 8. In opening, Mr. Twine pointed out that only persons possessing a knowledge of chemistry, physics and mechanics, and who could employ that knowledge for the realisation of chemical reactions on a large scale, could claim to be chemical engineers. They could not fail to notice the number of patents which had been applied for in connection with the chemistry and physics of gas manufacture, but, of all the number, how very few proved successful when put into practice, largely because the scientist was not an engineer, or the engineer was not a scientist. It was the combination that was required.

Among many problems of a technical nature to which men in the gas industry had devoted their attention were—the purification of coal gas by means of ammonia and other methods; increasing the quantity of nitrogen compounds either in the form of ammonia or cyanogen compounds; recovery of cyanogen compounds from coal gas, gas liquor and spent oxide; manufacture of ammonia compounds as sulphate, chloride or carbonate; distillation of tar; removal of naphthalene; extraction of benzol; complete gasification of coal; low temperature carbonisation; manufacture of sulphuric acid by combustion of sulphuretted hydrogen extracted from gas and also spent oxide; manufacture of purifying material; and manufacture of chemicals necessary for the treatment or conversion of any products or residuals arising from gas manufacture.

Relation Between the Chemical and the Gas Industries

The friendliest feeling existed between the chemical and gas industries which was as it should be, seeing that they were so often closely allied. Occasionally, however, the relations became strained; they all had their faults, but he felt it was largely owing to the short-sighted policy of the chemical manufacturers that gas undertakings were driven more and more into chemical manufacture owing to the high prices they were charged, on occasion, for the chemicals they required or the low price offered for residuals. One had only to inquire into the history of various gas undertakings, sulphate, or acid plants to realise that truth.

He was confident the day was not far distant when the gas liquor on a large works would be distilled by means of the waste heat of the retort house. The sulphuretted hydrogen and CO_2 (90 per cent. of which would be driven off practically free from ammonia) would pass through sulphuric acid (producing a small quantity of sulphate) and be burnt in a suitable furnace for the production of sulphuric acid. The remaining 10 per cent. H_2S would be absorbed by special iron compounds in properly-designed plant. Such a system of purification would necessitate the circulation of 150 to 200 gallons of gas liquor and, with the latest system of pipe services, ammonia losses would be reduced to an absolute minimum. The iron salts would be combusted in one section of the furnace, the gases from which would travel along with the still gases after combustion to the acid chambers. Cyanogen compounds would be extracted from the gas prior to treatment with gaseous or liquid ammonia in a manner somewhat similar to the present system in Birmingham of using sulphur (not spent oxide) which would be made on the works by limiting the air supply on one section of the furnace instead of burning all the H_2S to SO_2. The future gas engineer should be trained in the principles of chemical engineering.

Society of Public Analysts

New Officers for 1924

THE annual general meeting of the Society was held at the Chemical Society's Rooms, Burlington House, on Wednesday, February 6, when the President (Mr. P. A. Ellis Richards) delivered his annual address.

The following were elected officers and council for the ensuing year: President, Mr. G. Rudd Thompson; past-presidents (serving on the Council), Messrs. Leonard Archbutt, A. Chaston Chapman, Bernard Dyer, Otto Hehner, P. A. Ellis Richards, Alfred Smetham, E. W. Voelcker, J. Augustus Voelcker; vice-presidents, Messrs. S. F. Burford, F. H. Carr, A. More; hon. treasurer, Mr. Edward Hinks; hon. secretary, Mr. E. Richards Bolton; assistant hon. secretary, Mr. R. G. Pelly; other members of Council, Messrs. F. W. F. Arnaud, H. Ballantyne, E. T. Brewis, R. T. Colgate, R. L. Collett, J. C. Drummond, S. Elliott, E. M. Hawkins, H. F. E. Hulton, A. E. Parkes, A. R. Tankard, J. F. Tocher.

Ordinary Meeting

At an ordinary meeting on Wednesday, February 6, 1924, certificates were read for the first time in favour of Messrs. Philip Walter Alloway; Lorentz Oliver Brekke, B.Sc. (Leeds), A.I.C.; Alex Munro Cameron, B.Sc., F.I.C.; Thomas William Drinkwater, L.R.C.P., L.R.C.S. (Edin.), F.I.C.; John Ralph Furlong, Ph.D. (Wurzburg), A.I.C.; Ernest Griffiths-Jones, M.Sc. (Manch.), A.I.C.; Basil Gordon McLellan, F.I.C.; William Thomas Rigby, F.I.C.

Certificates were read for the second time in favour of: Messrs. Hugh Browning Brown, A.I.C.; Sidney Augustus de Lacy, A.I.C., A.M.I.Ch.E., Joseph Henry Lane, F.I.C., B.Sc. (Lond.); Leslie Herbert Lampitt, D.Sc. (Birm.), F.I.C.; Reginald Francis Moon, B.Sc. (Bristol); Maxmilian Nierenstein, D.Sc. (Geneva), Ph.D. (Berne); William Simpson Shaw, M.Sc., A.I.C.; Robert Norman Wright, A.R.C.S., B.Sc. (Lond.) A.I.C.; Misses Phyllis Honor Price, B.Sc. (Bristol); Mabel Suzanne Lavinia Snelus, A.I.C., M.P.S.

The following were elected Members: Messrs. Thomas Francis Doyle; George Hogan, F.I.C.; Frank Knowles; Archibald Knox, A.I.C.; Charles Roger Middleton, B.Sc. (Lond.), A.R.C.S., D.I.C., A.I.C.; Harold Richard Read, A.I.C., A.R.C.Sc. (Dublin).

Abstracts of Papers

In a paper by Mr. C. Ainsworth Mitchell, M.A., F.I.C., on "Osmium Tetroxide as a Reagent for the Estimation of Tannins and their Derivatives," it was pointed out that osmium tetroxide (the osmic acid of the microscopists) can be used as a sensitive reagent for tannins and their derivatives, being capable of detecting, *e.g.*, 1 part of gallic acid in 3,000,000. The colouration ranges from red-violet in dilute solutions to violet-black in concentrated solutions. Unlike the author's ferrous tartrate reagent, osmium tetroxide gives similar colorations with both the pyrogallol and catechol tannins. For quantitative work the ordinary 1 per cent. microscopic stain is diluted with 10 parts of water and a solution of 0·1 grm. of pure pyrogallol, catechol, or gallic acid is used as the standard. The colorations produced by catechol and pyrogallol are relatively proportional to their molecular weights and the same relationship applies to the colorations given by protocatechuic acid and catechol, gallic acid gives a relatively more intense coloration than pyrogallol. The method affords a convenient means of estimating the pyrogallol and catechol tannins toegther, in terms of catechol, pyrogallol, or gallic acid, and it has been applied to the analysis of various products such as extracts of wood, commercial sawdust intended for curing fish, bacon, etc. It has also been found applicable to the colorimetric estimation of tannins in coffee, hops, etc.

Mr. S. A. de Lacy, A.I.C., gave a "Demonstration of Apparatus for Fat Extraction and Solvent Recovery." The apparatus consists of an extraction vessel with a three holed stopper, one hole for the special key device, one for the attached condenser, and one for the tube to lead away the vapours of distilled solvent. The material to be extracted is suspended in a container supported in the extraction vessel, and the key device can be operated from the outside to close either the opening to the condenser or to the side tube, in turn. This device is essentially a thick circular rod attached to an oval-shaped platform with a drip point projecting from the lower surface.

A Diagram Showing the Uses of Sulphuric Acid in Chemical Industry

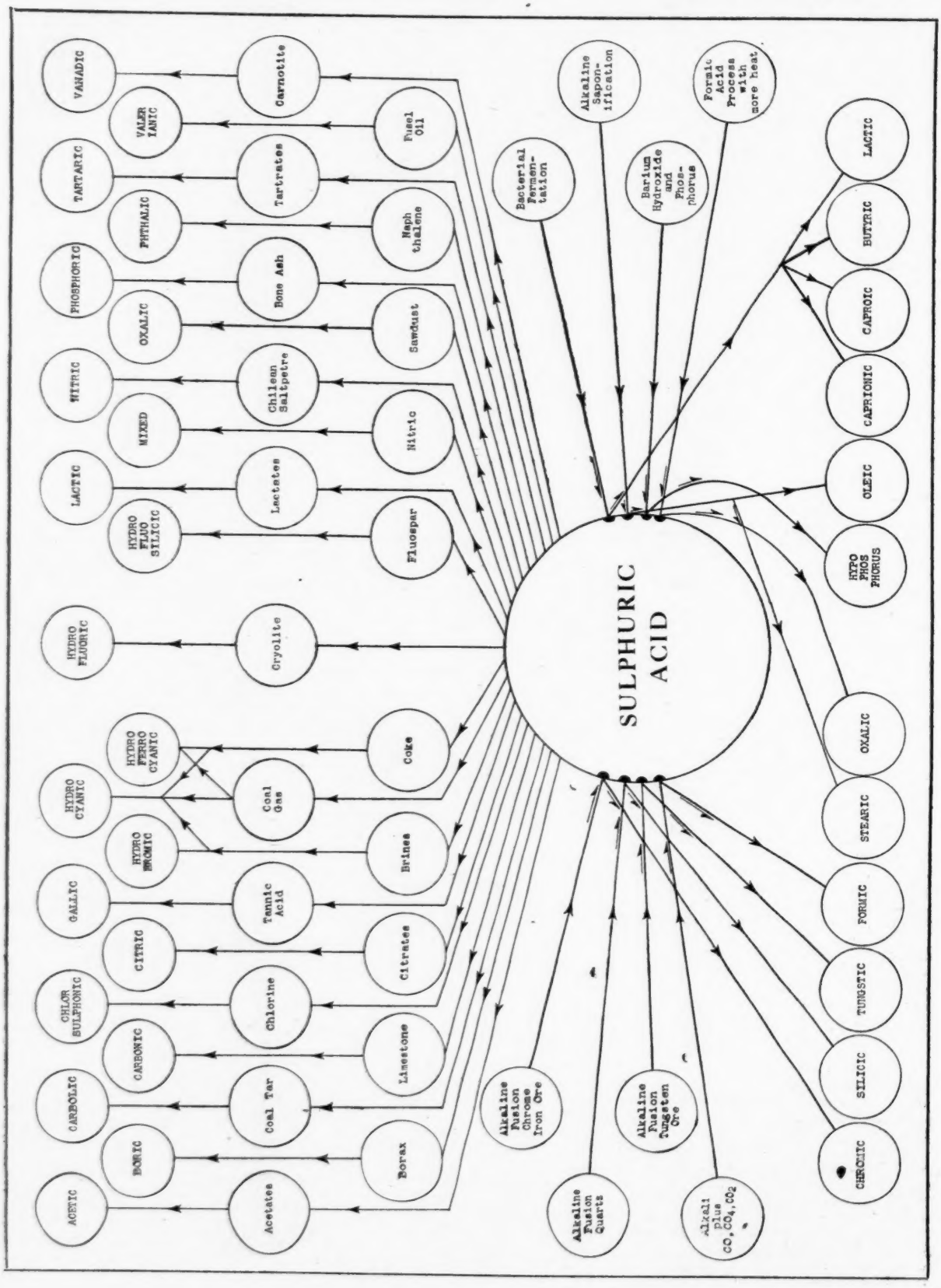


Diagram of Sulphuric Acid Uses

Basis of Manufacture of 33 other Acids

THE chart on the opposite page, which is based on information issued by the American Board of Census, is an attempt to show graphically how sulphuric acid underlies the production of other acids used in modern industry. The twenty-one circles at the top of the chart illustrate those acids which are produced by the direct action of sulphuric upon a natural salt or by-product of another process, usually liberating the free acid; for example, acetic acid from the action of sulphuric upon the acetates from the wood distillation industry, boric acid from the action of sulphuric upon the borax from lake brines, and so on. The twelve acids indicated at the bottom of the chart are produced by sulphuric acid after a preliminary operation—chromic acid from the alkaline fusion of chrome iron ore then sulphuric; lactic from a specific bacterial fermentation then sulphuric. The same process also produces butyric, caproic, and caprionic acids. The direction of the process is indicated by arrows.

Studies in Oil Hydrogenation

Society of Chemical Industry: Birmingham Section

Mr. E. J. LUSH, M.A. (Technical Research Works, London), read a paper on "Some Studies in the Kinetics of Oil Hydrogenation" at a meeting of the Birmingham and Midland Section of the Society of Chemical Industry held on Tuesday, February 5, at the University of Birmingham. Dr. Edward B. Maxted presided.

A continuous process of hydrogenation was described. Tubes were packed with activated nickel turnings, and oil was hydrogenated by flowing a film over the turnings in an atmosphere of hydrogen. The method of activation of the turnings was by anodic oxidation in a 5 per cent. solution of sodium carbonate followed by reduction in hydrogen at 250° C.—300° C. It was pointed out that the hydrogenation of oil consisted of three stages: first, the solution of hydrogen in oil and its diffusion to the surface of the nickel; second, the solution of the hydrogen (reaching the nickel in stage 1) in the nickel, and its activation by the nickel and diffusion to the metal surface; third, the combination of the activated hydrogen with the ethylene linkages of the oil. As these processes were successive the kinetics of the completed reaction would be the kinetics of the slowest process.

Mr. Lush gave figures based on the hydrogenation of coconut and cotton-seed oils to show that it was probable that in this continuous process of hydrogenation of oil in thin films the second stage was the slowest, while by the use of small percentages of powder catalyst the first stage was probably the slowest. Increasing mechanical agitation would tend to cause the rate of hydrogenation to be increasingly influenced by the second stage and would account for the different conclusions as to the kinetics of hydrogenation by different observers using different experimental conditions. The author showed on the screen the results of numerous experiments on the rate of hydrogenation of cotton seed, groundnut, palm kernel and coconut oils, which indicated that the rate of hydrogenation was proportional to the square root of the pressure and concluded by claiming that this was evidence of the possibility of measuring the rate of activation of the hydrogen by the nickel.

Dr. Maxted, Professor Morgan, head of the Chemistry Department of the Univeristy of Birmingham, Mr. George King (Secretary of the Section) and others contributed to the discussion following the paper.

Trade Commissioner in Jamaica

BY the courtesy of the Department of Trade and Commerce at Ottawa, it has been arranged that following the transfer to South Africa of Mr. G. R. Stevens, the Canadian Trade Commissioner in Jamaica, the duties of Imperial Trade Correspondent in that Colony shall be continued by Mr. J. C. Cormack, Mr. Stevens' successor. Mr. Cormack has already taken up his duties in Jamaica, and trade inquiries from British firms should therefore be addressed in future as follows:—Mr. J. C. Cormack, Canadian Trade Commissioner, 17, Port Royal Street, Kingston, Jamaica.

Chemical Trade Returns for January

Improved Chemical Exports

ACCORDING to the Board of Trade Returns, the imports of chemicals, dyes, drugs and colours during the first month of the year amounted to £1,118,917 in value, a decrease of £67,896 on January, 1923, but an increase of £39,547 on the December figure. Exports were valued at £2,413,130 in January, 1924, representing an increase of £166,297 on January, 1923, and £157,864 on December last. It may be noted that the figures for the total trade of the country show an increase in imports from £99,756,000 in January, 1923, to £101,259,000 in the month in question, exports diminishing from £66,939,000 to £64,235,000, the figures for December, 1923, being £109,190,006 for imports and £64,115,000 exports.

Examination of the figures given below shows that the most favourable increases appearing in the import table relate to borax and alizarine dyestuffs. The exports of coal tar dyestuffs, sulphate of ammonia and potassium compounds also show considerable improvement.

Imports in January

INCREASES.

		1924.	1923.
Bleaching materials	cwt.	4,096	3,804
Borax	,,	3,614	2
Crude glycerin	,,	6,835	747
Red lead and orange lead	,,	2,960	2,925
Potassium compounds, except nitrate	,,	528,544	329,221
Cream of tartar	,,	4,678	4,326
Alizarine dyestuffs	,,	12,902	793
Natural indigo	,,	91	15
Unspecified painters' colours	,,	68,490	46,072

DECREASES.

Acid acetic	tons	383	508
Acid tartaric	cwt.	1,916	2,154
Calcium carbide	,,	58,563	67,356
Distilled glycerin	,,	222	363
Nickel oxide	,,	1,533	2,140
Potassium nitrate	,,	4,650	31,365
Sodium nitrate	,,	107,688	230,502
Sodium compounds, except nitrate	,,	15,762	42,340
Zinc oxide	tons	537	657
Intermediate coal tar products, including aniline oil and salt, and phenyl glycine	cwt.	26	86
Synthetic indigo	,,	—	5,050
Coal tar dyestuffs, unspecified	,,	2,008	4,011
Barytes, including blanc fixe	,,	49,025	76,355
White lead	,,	6,527	12,216
Essential oils, natural, except turpentine	lb.	326,105	392,775
Turpentine	cwt.	8,198	32,692
Mercury	lb.	61,923	135,539

Exports in January

INCREASES.

		1924.	1923.
Acid sulphuric	cwt.	4,575	1,157
Ammonium sulphate	,,	36,289	23,836
Anthracene	,,	1,120	200
Benzol and toluol	gals.	16,074	4,495
Naphtha	,,	13,531	4,311
Tar oil, creosote, etc.	,,	5,639,441	4,627,684
Copper sulphate	tons	5,119	3,111
Glycerin	,,	12,477	5,311
Potassium chromate and bichromate	cwt.	3,841	3,572
Potassium nitrate, British prepared	,,	1,630	914
Other potassium compounds	,,	2,964	933
Caustic soda	,,	151,107	147,257
Zinc oxide	tons	228	204
Coal tar dyestuffs	cwt.	7,735	3,871
Barytes, including blanc fixe	,,	12,187	9,994
White lead	,,	15,517	15,365
Paints and enamels, prepared	,,	27,086	20,910

DECREASES.

Acid tartaric	cwt.	1,547	2,724
Ammonium chloride	tons	355	569
Carbolic acid	cwt.	5,729	8,036
Naphthalene	,,	8,347	13,528
Unspecified coal tar products	,,	20,483	42,444
Sodium carbonate, etc.	,,	556,974	582,810
Sodium chromate and bichromate	,,	2,806	7,522
Sodium sulphate, including saltcake	,,	31,562	81,943
Unspecified sodium compounds	,,	51,035	58,330
Dyes, except coal tar products	,,	3,904	6,597
Paints and colours ground in oil or water	,,	33,034	39,336
Unspecified painters' colours	,,	49,304	49,948

Chemical Aspects of Welding

Problems in Oxidation and Reduction

In a paper entitled "Some Chemical Aspects of Welding," read at a meeting of the Institution of Welding Engineers in London on Tuesday, February 12, Mr. J. R. Booer, F.C.S., first dealt briefly with the more important physical aspects of welding.

Passing to the changes of composition which lie wholly in the realm of chemistry he said that the principle which governed nearly all the reactions involved in welding was the principle of oxidation and reduction, and it was much to be regretted that many welders referred indiscriminately to "oxide," "deoxidising" and "carbonisation" without comprehending the true significance of these terms, and without understanding their mutual relationship. There were varying degrees of oxidation and reduction, and any transition from a lower to a higher state of oxidation constituted an oxidation, and *vice versa*. A reducing agent would combat the effects of oxidation, but it must be remembered that in reducing, the agent itself became oxidised, and the nature and chemical properties of the compound so produced must always be considered.

From the point of view of welding we had to consider the metal itself as the neutral point in the scale of oxidation and reduction. This was most fortunate, for in the wider chemical sense the metals which the welder generally handled were by no means the true neutral points, and they varied according to the element. This fact, coupled with the 20 per cent. of oxygen in the atmosphere, made it clear that the welder was working under conditions which were, chemically speaking, artificial. Furthermore, the presence of oxygen in the atmosphere tended to nullify the effect of many reducing agents.

Oxidation of Non-metallic Elements

Discussing familiar oxides and other metals the author said that the difficulty in the welding of nickel was that the molten metal readily occluded carbon monoxide and other gases, which caused it to swell up and become spongy. The true welding of aluminium was impossible without the use of a suitable flux to remove or prevent the formation of oxide. In view of the fact that alumina was absolutely stable to heat and that a temperature equal to that of the electric arc was necessary before it was affected by reducing agents, no attempt was made to effect reduction during welding, the main object being to prevent oxide formation as far as possible and to remove completely all the oxide that was formed, and for this purpose a flux of very high efficiency was required.

The oxidation, said the author, of the non-metallic elements encountered in welding was somewhat simpler. Oxidation took place readily, and in most cases the products were gases. The most important non-metallic element was carbon which formed CO and CO_2. Carbon monoxide possessed powerful reducing properties under certain conditions of temperature, but, unfortunately, welding temperatures were generally beyond the limit, and so carbon monoxide had little or no reducing effect. Unprotected welds made on iron and steel always showed a loss of carbon due to oxidation. Some other non-metallic elements in the metal would oxidise to undesirable products. There was one reaction of the element silicon which was of the utmost importance, namely :—

$$Si + CO_2 = SiO_2 + C.$$

This reaction had been extensively used in the oxy-acetylene welding of cast iron. A welding rod of high silicon content was used and carbon dioxide was supplied either by a flux containing carbonates, which decomposed on heating to give CO_2, or from the combustion of the acetylene.

Combustion of Acetylene

The paper then briefly examined the phenomena accompanying the combustion of acetylene. In reality, combustion takes place in two distinct stages. Stage 1, consists in the breaking down of acetylene and the formation of hydrogen and carbon monoxide as follows :—$C_2H_2 + O_2 = H_2 + 2CO$.

Stage 2 consists in the combustion of the products from stage 1, carbon monoxide being oxidised to carbon dioxide and hydrogen to water vapour, viz. :—

$$CO + O = CO_2.$$
$$H_2 + O = H_2O.$$

The explanation of the discrepancy between the practical and theoretical quantities of oxygen lies in the fact that the bulk of the oxygen in stage 2 is derived from the atmosphere. Thus the properly adjusted oxy-acetylene flame, burning at the nozzle of a well designed blowpipe, automatically obtains sufficient oxygen from the atmosphere to complete combustion, and it therefore follows that if excess of oxygen arrives at the blowpipe nozzle from the cylinder the excess will impinge directly on the metal, causing intense oxidation.

As all the components in the combustion of acetylene are gases moving at high speeds, it is obviously unreasonable to expect stages 1 and 2 to be sharply divided. The combustion may, therefore, be said to take place in three zones, in the oxy-acetylene flame. Zone 1 is the luminous zone and contains all the components of stage 1, viz., acetylene, oxygen, hydrogen, and carbon monoxide, the reaction not being complete at the end of zone 1. Zone 2 is completely non-luminous and in it stage 1 is completed and stage 2 also begins. The atmospheric oxygen comes into play at the beginning of zone 3, where the reaction is completed. It is zone 2 that is of most interest to the welder, as all welding operations are carried out at various positions in this zone, the nature of the metal, its melting point, and the dimensions being important factors in fixing the best position. It is impossible to fix temperatures without having definite conditions, but with good apparatus and pure gases well balanced, the temperature existing in the flame will attain 3,000° C., but does not exceed 3,500° C.

The composition of the gases in zone 2 is as follows :—Two parts carbon monoxide and one part hydrogen with very small quantities of acetylene, oxygen, carbon dioxide, and water vapour. It would appear at first sight that a gaseous mixture of such composition should possess powerful reducing properties, but two points must be considered. Firstly, the reducing properties are completely destroyed in zone 3, and secondly, at the temperature 2,000° C.–3,000° C. of zone 2, the stability of all common oxides becomes so great as to render them unreducible by carbon monoxide or hydrogen. This fact destroys the fallacy, which is found even in recent books on welding.

Conditions in the Electric Arc

In the electric arc the conditions are greatly simplified, and it is safe to consider the arc as a neutral source of heat provided it is properly protected. If oxygen is allowed to pass directly through the arc, however, it assumes intensely oxidising properties. The temperature of the arc is about 3,500° C. In both processes of welding the chief causes of oxidation are to be found, firstly, on the rod before it actually reaches the high temperature zone, and secondly, on the work and the deposited metal immediately after the high temperature zone. All the information points decisively to the fact that unless very special measures are taken to prevent it, oxidation isinevitable.

The prevention of oxide formation is approached from two distinct directions, chemical and physical. The chemical method makes use of suitable reducing agents which decompose any oxide formed, and the physical or protective method, which firstly protects the welding rod, secondly protects the deposited metal, and thirdly dissolves any undecomposed oxide. The reducing agent may be added to a flux or be incorporated in the welding wire or rod, but in this latter case the use of a suitable flux is still essential to prevent local oxidation.

A large variety of reducing agents have been used with varying degrees of success. One of the least successful and yet one which is still in extensive use is carbon. Silicon is not a reducing agent in the proper sense of the word. Calcium silicide, however, possesses very definite and powerful reducing properties on account of the presence of the element. Aluminium is one of the most powerful reducing agents obtainable, and if properly protected gives very satisfactory results. A most ingenious application of aluminium in this connection is to be found in the quasi arc electrode, where a fine aluminium wire is wound on the rod, a layer of asbestos being wound over the whole. The reducing properties of aluminium have been fully exploited in the Thermit welding process and the Goldschmidt patents for the preparation of metals and ferrous alloys. Another highly successful reducing agent is the metal titanium. It has been used as a scavenger with much success in the steel industry and is equally efficient in welding.

Production of Slags

In welding operations fluxes are used which produce a slag, which not only removes the by-products of reduction, but also the oxide of the metal which is being welded. The silica slags are of great value in welding and they fall into three classes: (1) soda-silica slags, (2) magnesium-silica slags and (3) soda-calcium silica slags. The soda-silica slags are produced by the use of sodium silicate ($Na_2Si_4O_9$) employed in various forms for welding mild steel, cast steel and nickel steel. They dissolve Fe_3O_4 quite readily, and form a complex sodium-iron silicate. The magnesium-silica slags are produced when asbestos is used. The soda-calcium silica slags are products closely akin to glass, and their use is confined to flux-coated electrodes. All these slags dissolve Fe_3O_4, readily, the soda-silicate variety being the most active in this respect, and they also remove alumina with the formation of alumino-silicates. A second variety of slags used in welding are produced from the element boron, generally encountered as borax or boric acid, and here the action on oxides is very much simpler. At high temperatures both borax and boric acid yield boric anhydride, which combines directly with the oxides of copper, cobalt, chromium, iron, nickel, and manganese.

Slag formation in aluminium welding is a separate subject. The chlorides of sodium, potassium and lithium form the basis of all reliable fluxes for aluminium welding, and there is every reason to believe that the activity of such fluxes is due to the formation of metaluminates of the type KO.AlO. Cryolite ($AlF_3.3NaF$) has been used as a flux both in aluminium manufacture and welding.

Welding Various Metals

Welding cast iron by the electric arc cannot yet be described as wholly satisfactory owing to the variation in physical properties frequently met. At present welding with a graphite electrode gives good results, but there is scope for a great deal of investigation in this direction and this is at present being undertaken. Welding cast iron by the oxy-acetylene process, however, can be carried out to perfection. Welding mild steel with the electric arc is extremely successful, but in any case a protective flux should be used. Mild steel can be welded with equal success by the oxy-acetylene process, but the problem of eliminating oxide when welding iron and steel is a very difficult one and has received considerable attention for many years. Medium and hard steels require careful handling, but indifferent results are obtained, because of the metallurgical phenomena which intervene. A flux similar to that used for cast iron should be employed. Provided oxidation is prevented by the use of a flux the measure of success of the operation depends on the right heat and mechanical treatments being applied. The welding of copper, brasses, and bronzes is a simple operation if the right materials are used. Aluminium is probably the most difficult proposition which the welder encounters, the rapidity with which aluminium is oxidised and the character of the oxide being the chief troubles.

Chemical control concerns more the preliminaries than the welding operation itself, and it is essential for a welder to ascertain that all the materials he uses in the form of fluxes, welding wires and rods, gases, etc., have been manufactured under efficient chemical control. Acetylene and oxygen in cylinders are usually delivered in a high state of purity, but those who buy carbide and make their own acetylene have to guard against the two dangerous impurities—sulphuretted hydrogen and phosphoretted hydrogen, which if not removed, lead to the formation of the sulphur and phosphorus eutectics causing defective welds.

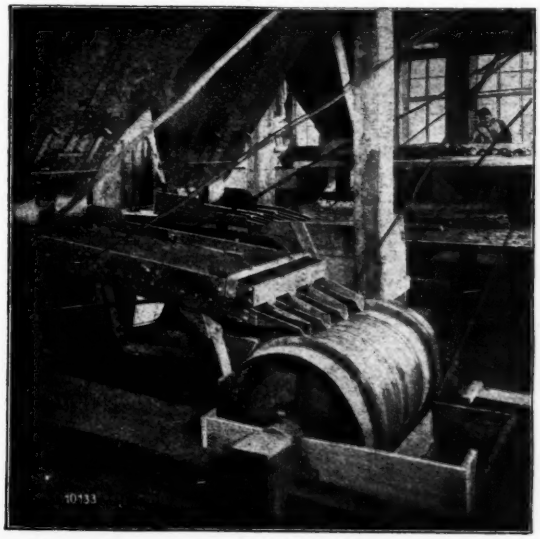
Electrical Conductivity of Refractories

In the general study of the electrical conductivity of refractories, being conducted by the United States Department of the Interior at the Columbus, Ohio, experiment station of the Bureau of Mines, tests have been completed on Maryland, Indian and Italian talcs from 500° C. to and including 1,000° C. These talcs at the present time are being used for the manufacture of electrical insulators and cores for electrical heating appliances. Since 1,000° C. represents the maximum temperature at which these talcs are burned and used, tests were not carried to a higher temperature. Preliminary tests have been made on diaspore and magnesite.

Recovery of Fuel from Ashes

Plant for Dry Magnetic Process to be Made in England

The importance of obtaining the utmost value from fuel used in works for driving machinery and other purposes is fully appreciated, and the number of designs of patent furnaces for steam-raising indicates that this matter receives very great attention. Generally speaking, the devices usually employed aim at burning all the combustible material in the fuel, leaving only the incombustible part as ash or clinker. In practice, however well-designed the furnace may be, there always remains a certain amount of half-burnt coal or coke among the ashes. The problem of separating this by floatation has not proved economically successful in most cases, due to insufficient density differences and the fuel lost in the "fines," and undoubtedly one of the most satisfactory means that has been used is



Ullrich Type Dry Magnetic Separator.

dry magnetic separation. This depends for its success on the fact that the ash from all coal is more or less magnetic, sufficiently so for the fine material to cling to the poles of a plain horse-shoe magnet. The "Ullrich" patent magnetic separator, which has been applied largely on the Continent, has already been described in The Chemical Age (Vol. 8, p. 638, June 16, 1923).

It will be remembered that the apparatus consists of a hollow rotating drum, over which the ashes are passed, and inside which the electro-magnets are deposed. 150 plants have been erected on the Continent with a total capacity of over 1,000,000 tons per annum (counting eight hours per day), in all classes of works, including the Bayer works at Leverkusen. The patents are held by a German firm, but the exclusive rights have now been acquired for the manufacture of the plant in England by the Fuel-Recovery Syndicate Ltd., 40, Westminster Palace Gardens, Victoria Street, London, S.W.1. The plant is available in various sizes from 1 to 20 tons per hour, so that it is suitable for both small and large users, and even in unfavourable cases the cost of the installation is said to pay for itself within a year. The separation by the magnetic process is so good also that very satisfactory slag bricks may be made from the residue, which are free from coal and coke which is otherwise detrimental.

It is interesting to note that magnetic separators of this pattern have other uses than fuel recovery, being used, for instance, in separating potash-bearing minerals from the ferruginous gangue in the working of the Italian potash deposits at Rocca Monfina.

Successful Helium Production

The Officials of the U.S. Bureau of Mines are said to be very pleased with the results of the trial runs of their semi-commercial helium plant at Fort Worth. One of the surprises of the tests was the fact that the plant developed a dependable output at three times its rated capacity. The preliminary runs are regarded as having been completely successful.

Reviews

THE UTILISATION OF LOW-GRADE AND WASTE FUEL. By W. F. GOODRICH. London: Ernest Benn, Ltd. Pp. 368. 42s.

The keynote of the industries to-day is that of economy. The stress of higher cost of materials and labour, coupled with the decreasing purchasing power of the consumer, renders every manufacturer increasingly alive to the need of reducing his wastage to a minimum, and things which in pre-war days were thrown to the waste dump as useless are now being used by newly-developed means of production. Perhaps in no department of industrial life has this fact been more felt than in the conservation of fuel. Fuel plays an important part in the cost of production of all manufactured articles, in a more or less degree depending on their character, no matter whether the fuel is used as a heating medium or as the agent for the production of power, and it has to be appreciated that there is little likelihood of the price of coal being reduced in view of the shorter working hours in the mines and the stabilised minimum conditions of miners' wages. This fact is now fully realised in all phases of industry, and it is in such an atmosphere that Mr. Goodrich's book makes its appearance, and its purpose is in full accord with the spirit of the times.

The book should make an appeal to a wide range of readers, and it can be thoroughly recommended as a complete survey of the subject from an essentially modern standpoint. The author is fortunate in having his book published by a firm who appreciates the need of good paper and printing in the make-up of an acceptable scientific publication, and whilst the binding is in the main good yet the sewing is not up to the standard of the rest of the work and should be strengthened in any future issues.

It is scarcely necessary to emphasise the large stocks of low-grade fuel which exist throughout the country. At every colliery the dump contains many thousands of tons, and there is within our knowledge at one colliery a heap containing 50,000 tons of dross material which, when dried and used by passing through a pulveriser gives a flame in the combustion chamber very nearly equal to that of the best coal, is capable of evaporating 7.5 lb. of water per lb. of fuel burnt. The use of low grade fuel by direct combustion after pulverising is almost entirely ignored by the author, and this is regrettable, because this method has many advantages which renders it superior, with some types of fuel, to any effort made to gasify it.

On the other hand the author deals very thoroughly with the utilisation of the lignites, or brown coal, and whilst this is not of direct application in England, yet in Ireland and on the Continent this chapter should be of considerable value. In addition to dealing with the problem of converting the low grade fuel into a form, either as a briquette or as gas, which would render it an efficient means of generating heat, the author has dealt in detail with the proper means of controlling combustion, and as his descriptions are frequently supported by operating data and costs this section of the subject is rendered very useful.

The book can be recommended to all interested in this important subject, and should be a very material help in quickening the interest of the industries still further in a matter which is of vital national importance. F. C.

ALLEN'S COMMERCIAL ORGANIC ANALYSIS. 5th Edition. Volume I. London: J. and A. Churchill. Pp. 796. 30s.

The first volume begins with a description of the operations usual in analytical organic chemistry, and then proceeds to deal with the alcohols, their simple derivatives, spirituous liquors, yeast, paper, starches, sugars, and the commoner aliphatic acids. In organic analysis one frequently deals with complex mixtures of substances which could be separated only with difficulty, and in many instances the procedure means the determination of certain class properties. We need only refer to petroleum in order to illustrate this point. In consequence, the valuation of commercial products is often determined by somewhat arbitrary standards. Although many of the methods now in use will not bear purely scientific criticism, yet for trade purposes they are sufficiently satisfactory. The methods of commercial organic analysis have developed on national or local lines, and at the same time have attained a firm footing in the business world. For this reason it is satisfactory to find that four sections of the book are written experienced by British analysts (J. L. Baker, W. A. Davis, L. Eynon, and T. H. Pope), while the importance of this publication in the United States is taken account of by contributions from five American chemists as well.

The treatise gives sufficient details regarding the preparation of a number of substances described to enable the reader to obtain an intelligent grasp of the subject. A chemist who is inclined to argue could easily pick out one method or another and find defects from his personal point of view, but the mere fact of the individual conception of technical organic analysis compels us not to criticise the book on that account. We would like, however, to point out one or two things. In the description of still-heads we should have expected to find mention of Raschig or Lessing rings if such antiquated apparatus as the Glynsky are shown, but perhaps theformer are dealt with in another volume. The chapter on "Yeast" is complese enough for a chemist who has some knowledge of bacteriology, but for general use a more detailed description of bacteriological methods would have been an advantage, and would have hardly affected the size of the book. In one or two places we note illustrations with the names of German firms, and on one of them (Fig. 46) there are even German words, "Dampf" and "Zur Pumpe," which may prove confusing. However, these are minor faults, which could be easily eliminated. On the whole, this volume is fully up to the high reputation of the preceding editions, and will continue to serve as a standard work of reference.

S. P. S.

GENERAL CHEMISTRY. By HORACE G. DEMING. New York: Wiley and Sons; London: Chapman and Hall. Pp. 605. 17s. 6d.

This book, an American college text-book of Chemistry, is evidently the production of an experienced and enthusiastic teacher of the subject. It is, in fact, predominantly a teaching book and not a treatise on chemistry. The author has rejected "such museum material as hypobromous acid, phosphoryl chloride, hydrazoic acid and the usual long catalogue of variously coloured inorganic salts," their place being taken by an extensive treatment of the fundamental theories and their more interesting applications in industry and in biology. Physico-chemical ideas, including the electronic theories of the structure of the atom, pervade the book from beginning to end, instead of being segregated in special chapters. With a view to relieving the student of the drudgery of his task, many lively devices of exposition are introduced, such as variety of type, very clear line drawings and diagrams, photographs of industrial processes, graphical summaries of the chapters, and so on. The author descends to the level of the plodder and gives him a chapter on "How Chemical Formulas are Remembered." There remains, however, a lingering doubt in our minds as to the ultimate effect of all this on the student himself. We have heard, of late, grumblings from the Universities at the helplessness of the students that come up to them, due, it is said, to "spoon-feeding" in the schools. Such a book as this might be considered open to the charge of continuing the spoon-feeding process. Yet the good features of the book are so many that there can be no hesitation in recommending it as a sound and clearly written description of present-day chemistry and its industrial applications. A. D.

ACETIC ACID (in German). By Dr. VIKTORIA KESSLER, Berlin. M. Krayn. Pp. 118. 2s. 6d.

The book is apparently written for business men, the technical part taking the background of the purely commercial portion. On the technical side only one point elicits our interest, namely, the mention of the importance which the preparation of acetic acid from calcium carbide has attained in Germany, as shown both by big production and noisy litigation concerning some important patents. Unfortunately this is practically all that is said about carbide acetic acid, apart from the mention of one or two patents, which we all know well. A chemist reading this book in the hope of acquiring useful scientific information will be severely disappointed. On the other hand, everything connected with the economics of the subject is dealt with exhaustively. We are wondering if an English volume written on these lines would command a sale, although nobody could deny that books of this character would prove of great service to leaders of industrial enterprises.

S. P. S.

New Appointment for Dr. Rée.

Chemist as President of the Manchester Chamber of Commerce

SIR WILLIAM CLARE LEES, who has just been knighted, and who was a director of the Bleachers' Association, retired from the presidency of the Manchester Chamber of Commerce on Monday, and is succeeded by Dr. Alfred Rée. The new president has not only been a director of the Chamber for 14 years, but has also occupied a prominent position in connection with the chemical industry, having formerly been a chemical manufacturer, and he is keenly interested in all questions of education and science in relation to commerce and industry. He has been a member of the Manchester Education Committee for 14 years, and is chairman of the Chemical Section of the College of Technology. He is a Doctor of Philosophy of Berne University and a Fellow of the Institute of Chemistry.

Dr. Rée was honorary treasurer of the Chamber of Commerce for three years, and he has been vice-chairman of the Chemical Section for some time. He has taken great interest in all branches of national and international Chamber of Commerce work. He is one of the three founders of the Association of British Chemical Manufacturers and he has been on the Council of that body since 1916. He was president of the Society of Dyers and Colourists from 1916 to 1918, the first chairman of the British Association of Chemists, and formerly one of the vice-presidents of the Society of Chemical Industry.

In addition to numerous other offices in connection with the industry, Dr. Rée has acted as inspector of research to the Board of Trade for three years, advising on matters connected with the establishing of the dyeing industry.

Institution of the Rubber Industry

The Ageing or Perishing of Rubber

IN a paper read before the Institution of the Rubber Industry recently at Edinburgh on "The Ageing of Rubber," Mr. Sidney A. Brazier, F.I.C., said that the "ageing" or "perishing" of rubber was one of the oldest problems of the industry. The inability of manufactured rubber goods to withstand changes in temperature or exposure to sunlight and air was the main difficulty in early manufacture. The discovery of the vulcanisation process, whilst eliminating the former trouble, merely added to the latter, in that it introduced the greater problem of all from the point of view of ageing properties—that of correct cure—as later work had shown that rate of ageing was considerably hastened by over-vulcanisation.

Analysis of samples of perished rubber showed that part had undergone considerable oxidation, and the fact that sunlight hastened this oxidation was early recognised. Measurement of the rate of oxidation of both raw and vulcanised rubber had shown that autocatalysis took place. The rate of oxidation was considerably increased by rise of temperature, and this formed the basis of the majority of "accelerated ageing tests," in which samples were stored in a suitable receptacle maintained at a uniform temperature and having a constant circulation of warm air to secure uniformity of oxidation.

Tensile Strength as a Test

Although formerly changes in weight were used to determine the extent to which ageing had taken place, the rate of decay was now generally followed by measurement of some physical characteristic, such as tensile strength. From a fall in tensile strength noted, the probable life of the sample of rubber under conditions of service could be estimated. Recent work by B. Marzetti had confirmed the part played by catalytic oxidation during accelerated ageing, complete deterioration in physical properties being found with an absorption of oxygen approximately 1 per cent. of the weight of rubber present. Other changes also take place, however, such as loss of sulphur by volatilisation and by continued vulcanisation

Owing to their effect on the physical properties of vulcanised rubber, organic accelerators may greatly modify the rate of ageing. On account of their opacity or other physical characteristics, however, many compounding ingredients might actually improve the resistance towards ageing. Protection against the action of light might also be obtained by use of suitable organic dyes, which dissolved in the rubber.

Chemistry in the Textile Mill

The Advantages of a Testing Department

MR. F. J. COOPER, of the Textile Chemistry Department of the Blackburn Technical College, gave an address on "The Application of Chemistry to the Science of Mill Management" at a meeting of the Blackburn and District Managers' Mutual Association on Sunday. He said that though he believed chemistry properly applied might produce an enormous improvement on the productive side he was not going to advocate the establishment of a chemical laboratory in every mill. The establishment of a small testing room would assist greatly in the effective management of the mill, however. In the first place it would enable them to test their yarn and deal with the many important matters coincident therewith.

It would provide them with information as to their fuel supplies and enable an eye to be kept on that fruitful source of trouble—oils for lubrication. He did not claim that accurate oil analysis was an easy problem. On the contrary it was very difficult, but in the course of their businesses it was not often they required full analyses. Certain simple tests, however, applied to all oils brought good results. By a system of that kind they would ensure efficient lubrication by using the most appropriate oil to ensure increased efficiency and, consequently, improved output. What a manager required to know was whether samples of oil were identical in character, and which oils were most suitable for the smooth running of his machinery. To obtain satisfactory answers to those questions simple, but continuous, tests were necessary in the case of every consignment.

These tests could be carried out by the use of inexpensive apparatus, and the results provided them with knowledge of considerable trade interest. The same argument applied in the case of sizing ingredients and the proper control of size mixings, which had formed the subject of so much discussion in textile circles within recent years. Then it was important to have knowledge of the water in use, of the temperature and ventilation of mills, and in dealing with the problem of dust, which was as important inside a factory as it was outside.

They would also appreciate the importance of colour as applied to textiles, and the usefulness of testing various classes of dyes, also of correctly estimating the proper percentages of wool and cotton in the preparation of union cloths. Those were a few of what he might term the immediate benefits of the system he had outlined.

"Chemical Synonyms and Trade Names"

THE dictionary and commercial handbook under this title compiled by William Gardner, described as "Works Chemist" (Crosby Lockwood and Son, pp. 271, 25s.) is intended to supply in a brief form a ready reference to synonyms and trade names commonly applied in commerce to chemical materials. The field covered is large, including minerals, dyestuffs, explosives, pigments, drugs, alloys, commercial chemicals, and substances in common use, and the statement of the chemical definition and commercial use is severely brief. The work, however, does what has, so far as we know, not been attempted before in this country, and can hardly fail to be widely useful. The matter is arranged in alphabetical classification, and contains 14,000 definitions and cross-references.

Iron Ores in British Columbia

THE proposal to establish on a large scale an ironmaking industry in British Columbia using native ores and fuels, being of considerable national importance, the Geological Survey of Canada in co-operation with the Department of Mines, British Columbia, has undertaken an investigation of the iron ore resources of the province. It has long been known that many bodies of iron ore exist on or close to the mainland coast and the shores of Vancouver Island. Except at a few localities where limonite or bog iron ore occurs, the deposits are all of magnetite carrying no titanium and, so far as known, having a very low phosphorus content. Considerable progress has already been made in the examination of the known ore occurrences, and it is expected that by the end of the year 1924 sufficient information will have been collected as will definitely indicate whether or no there exists a reserve of iron ore sufficiently large to warrant the establishment of a blast furnace plant.

Dyes That Kill Disease

Work by the British Dyestuffs Corporation

THE aid of dyestuffs in the war upon disease receives a new impetus from the creation of a special Fine Chemicals Department at the British Dyestuffs Corporation's works under Mr. Thomas H. Fairbrother, M.Sc., F.I.C., whose discoveries, made in co-operation with a Manchester bacteriologist, were so favourably received first by the Society of Chemical Industry two years ago, and last year by the Royal Society of Arts. The investigations of these two research workers showed that certain dyestuffs, even in a high state of dilution, speedily destroyed the bacilli of a wide range of diseases. They discovered one dye, for example, which, at a strength of one in five thousand, disposes of the anthrax bacillus; another was fatal to diphtheria; a third to typhoid, and so on.

One practical result of these discoveries was exhibited for the first time at the London Medical Exhibition, when the attention of medical men was drawn to glauramine—a powerful germ-killer derived from a yellow dyestuff and used in nose and ear surgery, for cleaning the skin prior to operation, and in other directions, notably the very successful treatment of ringworm. A new odourless disinfectant is now being produced from the same colour base, and the Fine Cehmicals Department are also preparing pure organic chemicals for research work and delicate re-agents to assist the pathologist in other directions. They are making, too, those microscopic stains which enable the pathologist to distinguish, one from another, the swarms of bacilli seen twisting about under the microscopic culture made from a sick man's tissues, a certain stain picking out certain bacilli from other groups and so giving the clue to the particular disease. Thus tubercle bacilli stain red when treated with magenta under certain conditions, nor can the stain be removed by acids. Again, the bacilli of anthrax are stained by gentian violet and are not decolorised in a certain process of staining by alcohol.

The making of these stains is said to be the world's tiniest industry. A pint of them may be had from a gramme of dyestuff, so that a ton of dyes would keep every practising pathologist going for a century. Yet this work now being undertaken in the new Fine Chemicals Department of purifying ordinary commercial dyestuffs for use on the microscope is one of the most useful as it certainly is not the least fascinating of the many applications of colour to disease.

Report of the N.U.S.W.

Parliamentary and Other Activities

IN the report of the executive of the National Union of Scientific Workers for the year ending December 31, 1923, which was adopted at the Annual Council Meeting in London, on Saturday, January 26, it is stated that, among other activities undertaken, a questionnaire was prepared and sent to all members of the last House of Commons, and is now being circulated to the new members of the present House, in which they were invited to support greater recognition of science. An inquiry was also addressed to co-operative and other industrial undertakings regarding their attitude towards science and the employment of scientific workers. The nature of the replies is stated to emphasise the need for this kind of propaganda.

Towards the end of the year the Executive accepted an invitation from the Joint Committee of the Labour Party and the Trade Union Congress to appoint representatives on a committee dealing with "Science in Industry." Dr. J. W. Evans and Major Church were appointed to a special committee of the British Guild to consider science and labour with a view to drawing up a programme of subjects to be discussed by representatives of science and labour at the British Empire Exhibition and of the invitation to Major Church to take the lead in forming a science group of members in the House of Commons, and this should enable further emphasis to be laid on the importance of science to the nation. They were also informed that at a week-end conference of the Industrial League and Council held in May to discuss the problems of the development of the resources of the British Empire the General Secretary was able to bring the point of view of the man of science prominently before the representatives of the large industrial undertakings present.

A number of meetings have been held under the auspices of the Union, including one held at Birkbeck College, where Sir Richard Gregory, Editor of *Nature*, spoke on "The Work of Science"; and at Liverpool, where the President Dame Helen Gwynne-Vaughan, with the Vice-Chancellor, of the University in the chair, gave an address on "Science and the Nation." A dinner was held at South Kensington in November, when Sir Thomas Holland, Rector of the Imperial College, Mr. F. E. Smith, Director of Admiralty scientific research, Sir Stewart Stockman, Chief Veterinary officer of the Ministry of Agriculture, Professor Leonard Bairstow and the General Secretary took part in a discussion on "A Representative Body for Science."

Largely due to the efforts of Professor J. Mclean Thompson, acting through the Liverpool Local Committee, Sir Richard Gregory and Major Church were invited by the local association of the British Association to run an unofficial Press bureau during the meeting of the British Association at Liverpool. The work of this unofficial bureau was made the subject of a report by Professor Thompson to the Council of the British Association, and at their December meeting they decided to appoint Major Church, Sir Richard Gregory, Professor Thompson and Mr. F. E. Smith as a special committee to consider the future possibilities of a Press bureau.

A Point in Glass-blowing Practice

Drawing of Large-Bore Tubes

DR. M. O. FORSTER, Principal of the Indian Institute of Science, Bangalore, forwards the following interesting note by Mr. K. N. Kini, M.A., of the Government Collegiate High School, Bangalore, describing "an easy method of drawing out a large bore glass tube with the aid of gravity":—

A beginner in glass-blowing finds it difficult to draw out a glass tube of large bore, say 1 in. or 1½ in., so as to get a cone symmetrical in shape and having uniformly thick walls. The ordinary method of thickening the walls of the tube at a particular place and then drawing it out is found rather too difficult for him. I have found the following method so easy that people who have hardly done any glass-blowing have been able to draw big bore tubes very neatly.

Have the blow-pipe flame AB (obtained using a gas jet about 2 mm. in diameter) horizontal. (Fig. 1). Hold the tube CD (shown by the dotted lines) in the middle of the flame,

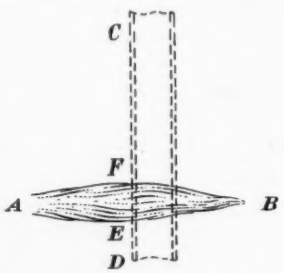


FIG. 1.

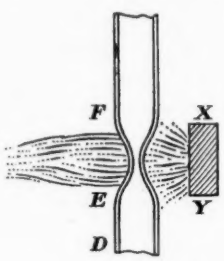


FIG. 2.

the part ED about ¾ in. or 1 in. long projecting down the flame and keep the tube rotating about a vertical axis. The portion FE of the tube will get softened, and due to the weight of ED will be slowly drawn out as a jet with conical shape as shown in Fig. 2. The walls of the jet will be found to be as thick as those of the main tube itself, if not thicker.

If the tube CD is not long enough a cork may be inserted at C with a long tube of narrow bore passing through it to serve as a handle. Even if the tube is only 6 in. long it can be drawn out to a jet at one or both ends with very little waste of glass tubing. The whole operation can be conducted in about 10 minutes easily.

In the case of tubes of 2 in. or 2½ in. diameter and also in the case of hard glass tubes, a tile or asbestos board XY can be kept just in front of the flame so as to reflect heat on that part of the tube FE remote from the worker and thus concentrate heat on it.

Generally the tube will get hot du[illegible]he escape of hot gases through it and the worker may o[illegible]en find it too hot to hold the tube. It is, therefore, better to wrap paper round it at the place where it is to be held before beginning the operation.

Dye Company's Directors Sued.

Claim for Recovery of £25,000

On Wednesday Mr. Justice Horridge and a special jury had before them an action brought by the Midland Bank against the executors of the late Lord Shrewsbury and Sir Henry Busby Bird and Mr. James Gibson, of Stretford Road, Manchester, to recover £25,000 alleged to be due on a guarantee given to the bank for an overdraft made to the Aniline Dye and Chemical Co., of Manchester, of which Lord Shrewsbury, Sir H. Bird, and Mr. Gibson were directors.

Mr. Stuart Bevan, K.C., for the bank, said that the plaintiffs had signed judgment against Mr. Gibson, and the action was now only with the other defendants. The case that was being set up by Sir H. Bird and the executors of Lord Shrewsbury was that while a document was undoubtedly signed it was signed by the fraudulent misrepresentation of Mr. Gibson, who, it was alleged, put it before them simply as a form for specimen signatures for the use of the bank. Among other defences raised were contentions that there was no liability for any indebtedness of the company before the date of the guarantee, and there was also a question respecting the right of the bank to deal with certain securities that had been lodged.

Counsel said he would contend that plaintiffs were entitled to rely on the guarantee, and he would submit it was apparent from the correspondence that the late Lord Shrewsbury and Sir H. Bird became directors of this company and acquired shares with a view to making a market in them, and he would show that they accepted these positions without making any inquiries regarding the position of the company.

The hearing was adjourned.

Affairs of Becker & Co.

At a meeting of the debenture stock holders and note holders of Becker and Co., Ltd., held in London on Friday, February 8, the Receiver (Sir Basil Mayhew) said there were 154 debenture stockholders and 1,500 note-holders. The present company was formed in 1908 with a capital of £100,000, which was increased later. Becker and Co.'s interest in the pulp and paper trades had widened considerably within the last few years, and as the depression in these trades became more and more acute the difficulties got altogether beyond the powers of the board to manage. In his opinion the failure was largely to be attributed to over-trading, with all its consequences. Enormous credits were given by Becker and Co. to its associated companies, with—as proved to be the case—little chance of recovering. The position of the company became critical in the latter part of last summer.

The Receiver went on to say that the book value of the assets on the day of his appointment was £1,707,614, of which £824,900 was pledged to creditors, and £882,690 was unencumbered and apparently available for the debenture-holders. It was impossible at this early date to estimate what the realisations would be, but his preliminary and necessarily very approximate estimate was £110,000, which did not include certain trust bonds. The amount those at the meeting would eventually receive was highly problematical.

Artificial Silk Manufacturer's Affairs

Reporting on Wednesday to creditors and shareholders of the Kent Silk Mills, Ltd., Mr. J. Barwick Thompson, Official Receiver, said that during the five years of its active existence the company had lost the £158,000 cash subscribed for its capital. The directors acquired the British Artificial Fibres, Ltd., David Whitfield and Co. (1921), Ltd., crêpe de chine manufacturers, of Macclesfield, and the Omega Manufacturing Co., Ltd. They also acquired premises for shops. The secret process, which was known as cupra ammonia process, could not be utilised at a profit, to which fact the failure of the company was attributed. At the date of the winding-up order there was an outstanding balance of £10,254. On September 26, 1923, the Court appointed Mr. E. W. Lupton, C.A., 3, London Wall Buildings, E.C., as receiver on behalf of the debenture holders. An offer of £26,000 for the property and assets had been accepted. The accounts under the liquidation showed total liabilities £33,935, and a surplus of £4,000 in assets over liabilities, but a total deficiency of £195,421 with regard to shareholders.

Affairs of Baiss Bros. and Co., Ltd.

Meeting of Creditors

The creditors of Baiss Bros. and Co., Ltd., lately trading as wholesale druggists and chemical merchants, Thames House, Queen Street Place, London, met on Friday, February 8, at the offices of Edward Moore and Sons, Thames House. The chair was occupied by Mr. E. Norton, liquidator.

The company went into voluntary liquidation in 1922, and on August 31 of that year an approximate statement of affairs was submitted which showed assets of £34,162 8s. 4d. Those had actually realised £27,057 15s. 1d. The principal receipts by the liquidator had been stock, book-debts, loans and advances, and surplus from fully secured creditors. The stock was originally set down at £9,000, and it had realised £4,665 10s. 2d., whilst the book-debts of £7,700 had produced £7,252 12s. 7d. In 1922 the loans and advances were valued at £1,902 6s. 7d., but the liquidator pointed out that he had been able to realise £4,244 13s. 9d. No value was originally placed on the goodwill, but it had been disposed of for £1,500, while the lease of the Bermondsey premises had produced £500. Nothing had been received on account of the consignment and agency accounts, which in August, 1922, figured at £2,096 8s. A sum of £2,096 8s. had been recovered in respect of Excess Profits Duty, whilst the surplus from securities in the hands of fully secured creditors, amounting to £7,858 10s. 8d., had realised £5,095 19s. 10d. During the course of the liquidation the trading payments of the liquidator totalled £26,983 19s. 1d. against receipts of £26,898 18s. 4d., or a loss of £85 0s. 9d. The net receipts in the hands of the liquidator had totalled £26,972 14s. 4d. The total costs of the liquidation, including the liquidator's remuneration, were £2,506 2s. 8d., whilst preferential claims of £1,005 14s. 5d. had been discharged. Three dividends equalling 8s. in the £ had been declared on liabilities admitted amounting to £51,161 15s. 6d. Those dividends had absorbed £20,445 0s. 2d., and the liquidator pointed out that there was a balance at the bank of £3,015 17s. 1d. The probability was that a further dividend of 1s. in the £ would be paid from the balance in the bank, making a total of 9s. in the £.

The creditors passed an informal resolution approving of the liquidator's accounts.

Liquidation of Fine Chemicals, Ltd.

The affairs of Fine Chemicals, Ltd., were brought before the Chancery Court in Dublin on Tuesday, January 29, by Mr. Walter Conan, who sought authority to summon a meeting of creditors, and asked for an order that he might be at liberty to distribute the assets without regard to the claims of Mr. Bernard Halligan as creditor. The liquidator, Mr. Walter Conan, in an affidavit, stated that the company was originally a private one with a capital of £25,000, and was formed to carry on the business of manufacturing chemists. In April, 1920, it became a public company, and the capital was increased to £40,000. The management was in the hands of Mr. B. Halligan, one of the directors, and in the opinion of the liquidator the accounts were kept in a fashion which was not only lax and careless, but showed a complete disregard for many of the regulations provided by the Companies Acts. Mr. Halligan, on the other hand, claimed £362 as balance of travelling expenses incurred on a visit to America on the company's behalf, and £425 arrears of salary.

The Master of the Rolls referred to chambers the matter of determining the sums owed between Mr. Halligan and the Company.

Removal of Pebbles from Clay

A study of the removal of pebbles from clays used in the manufacture of heavy clay products is being made by the United States Department of the Interior through the Bureau of Mines. The first work undertaken in this problem consists of a survey of the methods employed and proposed for the removal of pebbles from surface clays. Clay manufacturing plants have been visited for the purpose of observing methods used in separating pebbles. A number of untried methods for the cleaning of such clays will be studied by the Bureau of Mines. This work is being performed at the Ceramic Experiment Station, Columbus, Ohio, in co-operation with Ohio State University.

Chemical Matters in Parliament

Safeguarding Industries

MR. MILNE (House of Commons, February 12) put a motion relating to the safeguarding of industries: That in view of the conditions obtaining in foreign countries it is necessary to safeguard more effectively industries in this country which are or may be seriously affected thereby, and with the object of providing increased employment it is desirable to appoint an expert committee to inquire into the most effective way of dealing with this problem. After a brief debate Mr. A. V. Alexander, Parliamentary Secretary to the Board of Trade, replied to points raised, saying that the mover of the motion had asked for power to regulate imports and to encourage the production of foodstuffs, providing that special care was taken that such action would not increase the price to the consumer. But no constructive proposals for safeguarding the consumer had been put forward. He should have thought that the country had had sufficient experience of the working of the Safeguarding of Industries Act. His information was that with the exception of enamel hollow-ware the Act had had no material effect in the increase of employment in any trade covered by it. So far as depreciation in currency was concerned, he thought it would be agreed that an improvement was taking place on the Continent. It would probably be less required in the future than in the past, in consequence of the efforts at stabilisation which were being made on the Continent.

On a division the figures were:—For the motion, 103; against, 290; majority against, 187.

British Traders and Germany

Mr. Snowden, Chancellor of the Exchequer (House of Commons, February 12), replying to questions by Mr. Hudson and Mr. Hillary (Harwich, L.) on the difficulties experienced by British traders in consequence of the refusal of the German Government to honour further reparation receipts, and the imposition on British traders both of the 26 per cent. charge and other charges, said:—I am aware of the loss and inconvenience caused to British traders by the failure of the German Government to fulfil its obligations. This has formed the subject of strong protests both by the late and the present Governments. The German Government having failed to make any satisfactory proposals, renewed representations were made to them last week, of which I expect to hear the result very shortly.

Mr. Pringle: Will the Government not consider repealing this Act altogether?

Mr. Snowden: If the negotiations which are now going on between this Government and Germany fail, then all the circumstances will be taken into consideration.

Middlesbrough Cement Contract

Mr. T. Thomson (House of Commons, February 12) asked the Minister of Health if he was aware that the Unemployed Grants Committee had refused to allow the Middlesbrough Corporation to buy 400 tons of French cement required for street work during February, although the price was 11s. per ton less than the British Cement Combine price; had this been done by his authority, and, if so, would he reconsider his decision so as to avoid placing an unnecessary burden of £220 on the backs of the already overburdened ratepayers.

Mr. Wheatley: As the hon. member is aware, it has been a condition of the giving of unemployment grants that, unless there are exceptional reasons to the contrary, British materials shall be used. (Cheers.) I understand that, in view of the reduction in the price of British cement, the Unemployment Grants Committee did not feel on this occasion that they could properly give a grant to the corporation unless they used British cement.

Fuel for Internal Combustion Engines

Replying to a question by Mr. Hardie on the subject of fuel for internal combustion engines, Mr. Sidney Webb (House of Commons, February 12) said the Government was taking a leading part in the research which was taking place on the subject, and he referred the inquirer to the reports of the Fuel Research Board issued by the Department of Scientific and Industrial Research. Moreover, particular attention was being devoted, both by Government and by private interests, to the carbonisation of coal at low temperature, but it would be premature to say that the technical and economic problems involved had been completely solved.

Traders and German Reparations

Deputation to the Treasury

A DEPUTATION attended at the Treasury on Monday, complaining that trade was being very seriously injured by the continued deadlock over the Reparations levy of 26 per cent. The deputation was introduced by Mr. F. C. Linfield, M.P. The following official statement was subsequently issued: "Mr. William Graham, M.P., Financial Secretary to the Treasury, received a deputation to-day representing the china and glassware and fancy goods, sports and games sections of the London Chamber of Commerce, and representatives of other trades affected by the German Reparation (Recovery) Act. The deputation laid before Mr. Graham the views of the traders concerned on the serious difficulties which have arisen as the result of the refusal of the German Government to reimburse German exporters for sums deducted in this country in payment of German Reparation recovery duty. Mr. Graham made a reply appreciating the urgency and the gravity of the problem, and recognising the necessity for an early decision. A reply was expected from the German Government within the next day or two, and everything possible would be done to expedite the decision."

On Tuesday a question was asked in the House of Commons on the matter, and is reported elsewhere in this issue.

Action by the F.B.I.

The directors of the Federation of British Industries have written to the President of the Board of Trade with regard to the report that German exporters are making extensive arrangements for evading the payment of duty under the German Reparation (Recovery) Act by sending goods here through neutral countries. The letter inquires what action the Government propose to take in the matter, as the present position is clearly one which was not contemplated either when the original Act became law or when the Order made by the Board of Trade in May, 1921, was introduced. It is contended that the Order facilitates the evasion, as it exempts from the provision of the Act "any article which is proved to the satisfaction of the Commissioners of Customs and Excise not to have been first consigned from Germany to the United Kingdom."

Magadi Soda Meeting

AN extraordinary general meeting of the Magadi Soda Co., Ltd., was held on Wednesday for the purpose of considering and, if thought fit, passing a resolution placing the company in voluntary liquidation, appointing Mr. A. W. Tait liquidator, and electing two holders of ordinary and/or deferred shares of not less than two years' standing to act as an advisory committee, and to co-operate in the liquidation of the company and its proposed reconstruction.

After a long and heated discussion an amendment proposing an adjournment for the purpose of considering a scheme of reorganisation under section 45 of the Companies Consolidation Act, and appointing a committee of five shareholders to confer with the board and the receiver for that purpose was defeated on a show of hands, 46 voting for the amendment and 87 against. A poll was demanded.

The Chairman then put the original motion to the meeting amid protests by shareholders, who claimed that the poll on the amendment should first be taken. On a show of hands 87 voted for the original resolution, and 52, under protest, against. A poll was again demanded.

The following shareholders, Mr. Harold Redpath, Mr. H. J. Stephens, Mr. E. Harlow, Mr. Rothwell, and Mr. Sheard, were appointed as a committtee to act with the liquidator, subject to the original resolution being duly carried.

The result of the polls will be declared later.

American Production of Synthetic Phenol

MR. L. B. REDMOND, vice-president of the Bakelite Corporation of New York, in urging the retention of the present tariff on phenol, pointed out that the Bakelite Corporation has been turning out synthetic phenol in the United States since March last at the rate or 4,000,000 lb. per annum. It is hoped shortly to increase the output to 7,000,000 lb. annually, the domestic demand being estimated at 11,000,000 lb. Mr. Redmond stated that he believed that they could eventually make it for 20 cents (about 10d.) per pound. At present the price is 25–28 c per lb., and natural phenol is 11 to 12 cents per lb., the greater part coming from Great Britain.

From Week to Week

DR. W. R. ORMANDY has been appointed President of the Institution of Automobile Engineers.

MR. E. H. S. VAN SOMEREN has received the degree of B.Sc. in chemistry with second class honours in the University of London.

MR. R. E. PRIESTLY, M.A., Fellow of Clare College, Cambridge, has been appointed Secretary to the University Board of Research Studies.

THE "SALUS" CO., LTD., announce that their new address is Euston Tube Station, Drummond Street, London, N.W.1, and their telephone number "Museum 1044."

MR. C. S. HITCHIN, employed in the laboratory at the Vauxhall Station of the South Metropolitan Gas Co., has passed the Intermediate B.Sc. at London University.

DR. ALEXANDER SCOTT, who has been advising Mr. Howard Carter in the work of preserving the treasures from the tomb of Tutankhamen, left Egypt for England last week.

THE BIO-CHEMICAL DEPARTMENT at the Middlesex Hospital is now making insulin by a new method, which it is hoped will enable its general produce to be rendered less costly in the near future.

THE HOME SECRETARY has certified the grinding and glazing of metals, processes incidental thereto, and the cleaning of castings, to be dangerous, and proposes to make regulations to apply to all factories in which these processes are carried on.

EDINBURGH UNIVERSITY, under the will of the late Miss Jane Laurie Berwick, of Edinburgh, receives a furnished home and £1,000, the home to be used for medical lecturers, and graduates engaged in medical and science research work.

THE EMPLOYMENT of non-union men was the cause of a strike at the works of May & Baker, Ltd., Battersea, London, affecting 250 employees. A deputation from the strikers waited on Mr. Blenkinsopp, the managing director, on Friday, February 8, but without result, and the strike was continued.

DR. OSCAR BRACK, for many years manager of the ammonia works at Oppau and Merseburg of the Badische Anilin v. Soda Fabrik, is, according to *Chemiker Zeitung*, proceeding to the Argentine to build and operate a factory for chemical and pharmaceutical products in Rosario for P. Soldatti and Co., of Buenos Aires.

WE REGRET to announce the death of Mr. F. G. Adair Roberts, J.P., on Monday at Boscombe (Hants) in his 82nd year. Mr. Roberts was a director and the vice-chairman of A. Boake, Roberts and Co., Ltd., manufacturing chemists, of Stratford, London, E., and had been associated with the firm for nearly fifty years.

IT IS ANNOUNCED that Dr. Jacques Loeb, head of the division of physiology in the Rockefeller Institute for Medical Research, died at Hamilton, Bermuda, on Tuesday, after a brief illness. Dr. Loeb had an international reputation as a physiologist and developed particularly the chemical explanation of many physiological phenomena.

IN GIVING EVIDENCE at the Law Courts on Monday in connection with a case arising out of the use of "Inecto" hair-dye, Mr. James Colwell, a public analyst, said he had found an analysis that one of the two bottles of the dye contained paroform and the other peroxide of hydrogen. It was common knowledge that paraform caused irritation of the skin and eczema in some cases.

THE BURSTING of a naphthalene tank at the tar and ammonia distillery of Joseph Turner and Co., at Queensferry, Flintshire, on Tuesday, caused a fire in which one man was killed. A still blew up, and burning tar was scattered over a radius of eighty yards, setting fire to the boiler house roof, the electric power house, and the ammonia house. The damage done is estimated at about £4,000.

THE MEETING of the Institution of Chemical Engineers which was announced to take place at the Engineers' Club, London, on Friday, has had to be postponed until Monday, February 18, owing to the fact that accommodation was not available on the earlier date. A paper is to be read at the meeting by Mr. D. M. Newitt on "The Transport, Storage and Distribution of Hydrochloric Acid."

THE NATIONAL DRUG AND CHEMICAL WORKERS' UNION, with other unions concerned, are proposing to make application to the Drug and Fine Chemical Manufacturers' Association for a new agreement. The proposals include a fresh system of grading, standardised conditions and better wages. Eighty per cent. of the industry will be covered by the programme, and between 20,000 and 30,000 workers are involved.

DR. H. V. A. BRISCOE, lecturing at Armstrong College, Newcastle, on Saturday, February 9, on "The Burning of Carbon," introduced some interesting experiments touching on the subject, commencing with the burning of charcoal. He also dealt with the burning of graphite, and the diamond, the slow burning of carbon in animal metabolism and the utility of such compounds as carbon monoxide and carbon dioxide.

PROFFSSOR G. W. TODD, of Armstrong College, Newcastle-on-Tyne, delivered a lecture on the "Structure of the Atom" before the Newcastle Literary and Philosophical Society on Monday. He traced the growth of our knowledge of the atom from the time of Dalton down to the development of the nucular theory of Bohr and Langmuir. The lecture was illustrated with slides and models, and certain portions of the subject were demonstrated by experiments.

THE QUESTION of the establishment in Birmingham of headquarters for the principal technical and scientific societies in the Midlands was discussed at a meeting of representatives of these societies on Monday at the Chamber of Commerce. The meeting was called at the instance of the committee of the Birmingham Engineers' Club, and resulted in a resolution being adopted approving the proposal, to be carried into effect under the auspices of the James Watt Memorial Fund.

A JOINT MEETING of the Biological, Physical and Chemical Section of Armstrong College, was held on Friday, February 8, when a discussion took place on "Plant Sugars." Mr. Collins for the botanists, presented certain hypothesis from chemical experiments he had made with cereal plants. Dr. Griffiths remarked that they did not know how sugar was formed in plants and that the processes in the living organism were far more complex and very different to the processes worked out in the laboratory. Cane sugar was formed in the plant but was rapidly changed into starch.

AT A MEETING of the Institution of Petroleum Technologists in London, on Tuesday, Mr. C. H. McCarthy-Jones read a paper on "Electricity Applied to the Winning of Crude Petroleum." He said that in the past and even now it was the practice to develop the necessary power for drilling, pumping and other operations with small steam plants and an incredible waste of crude oil. Economically it was always preferable to concentrate the power development in as large units as possible. This could only be achieved in practice by generation and distribution of electric energy. In the course of time suitable electric motors had been devised for operating the main and auxiliary plant at oil wells, and the lecturer described these in detail, with special reference to the Yenangyoung Field in Burmah.

Blinded Soldiers as Telephone Operators

IT may not be generally known that one of the most successful occupations taught to the blinded soldiers at St. Dunstan's is telephone operating. A large number of these men have found employment with important business firms and organisations in London and the provinces, and not a few employers state that their boards have never been so well and efficiently managed as by their blinded soldier operators. This may be because the freedom from outward distraction—a natural accompaniment of blindness—enables the blinded operator to concentrate on his work to a much higher degree than is possible for a sighted operator.

As St. Dunstan's has several fully-trained men ready for work, some of our readers might care to give a St. Dunstan's operator a trial? If so, the authorities at St. Dunstan's Headquarters, Inner Circle, Regent's Park, London, N.W.1, will gladly supply full particulars. It may be mentioned that the employer's liability for a blinded soldier operator is no greater than in the case of an ordinary employee. To his employer he is a perfectly normal member of the staff; his special needs as a blinded ex-service man are the sole and permanent responsibility of St. Dunstan's After-Care Organisation.

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Abstracts of Complete Specifications

209,188. DISCHARGING VAT DYESTUFFS. The British Alizarine Co., Ltd., Trafford Park, Manchester, R. B. Harley, 27, Daresbury Road, Chorlton-cum-Hardy, Manchester, W. H. Dawson, Bracklyn, Bowdon, Cheshire, and T. C. Nichol, 273, Barton Road, Stretford, Lancs. Application dates, July 6, 1922 and February 7, 1923.

The process is particularly applicable for the production of designs on cotton dyed with sulphurised blue indo-phenol carbazol dyestuffs or like dyestuffs such as hydron blue. The material may be impregnated with a water soluble salt of a weak organic carboxylic acid with a polyvalent base such as calcium acetate or zinc acetate in conjunction with reducing discharging agent. In an example, the material is dyed and then impregnated with calcium acetate. The discharging is produced by printing with a mixture of gum, glycerol, sodium acetate, formosul (sodium hydrosulphite formaldehyde), leucotrope W, zinc acetate, calcium acetate, and water. The material is then steamed for twenty minutes at 130° C.

209,350. ARSENIOUS SULPHIDE SLUDGES, TREATMENT OF—FOR THE SEPARATION OF THE SULPHIDE FROM THE ASSOCIATED LIQUID. L. A. Jordan, The Chestnuts, Brantham, Suffolk. Application date, April 10, 1923.

When sulphuric acid is de-arsenicated by sulphuretted hydrogen gas, an arsenic sulphide mud is obtained. This by-product is a stiff yellow paste containing 10–15 per cent. of As_2S_3, the remainder being mainly chamber sulphuric acid. The separation of the arsenious sulphide from the acid is facilitated by adding a comparatively small proportion of an organic substance such as benzene, petrol, paraffin, or other mineral oils, toluene, carbon bisulphide, cresols, tar, oils, chloroform and turpentine. The organic liquid must be chosen according to the substance to be treated—*e.g.*, aniline or pyridine would not be suitable if the substance were acid. The suitability of the organic substance is determined by a preliminary test, the sulphide separating readily from the acid if the liquid is suitable. The treated mud may be filtered on a vacuum filter, and about 90 per cent. of the acid liquid may be recovered at the first operation, without dilution with wash liquid. The separation may also be facilitated by increasing the temperature. The arsenious sulphide recovered contains the organic agent, and it may be dried with or without recovery of this agent ; it may also be dissolved in caustic soda, sodium sulphide, sodium poly-sulphide, or other alkalies to produce compounds such as calcium thio-arsenate, which is used as an insecticide. About 3 per cent. of benzene or kerosene is found to be sufficient for the process. The maximum amount of sulphuric acid may be recovered by treating in a centrifuge, and then mixing with water and treating again in a centrifuge or vacuum filter. The arsenious sulphide may be burned to arsenious oxide, and the sulphur dioxide returned to the chamber process.

209,355. CATALYTIC BODIES, PREPARATION OF. V. L. Oil Processes, Ltd., and O. D. Lucas, Vickers House, Broadway, Westminster, London. Application date, April 26, 1923.

Catalytic substances have been prepared by reducing a mixture of a metallic oxide and an organic metal compound such as an oxalate, tartrate, acetate or carbonate, which evolves carbon monoxide or dioxide on heating, the mixture being briquetted by a reducing binding agent. In this invention the reduction is effected in two stages, in the first by a carbonaceous reducing agent. The material is then ground, mixed with more reducing agent, and heated to a higher temperature to sinter the reduced metal. The reducing agent in the first stage may be about 10 per cent. of tar and about 1 per cent. of ground carbon, the temperature employed being 700°–800° C. All the carbon monoxide and dioxide are thereby driven off, but the oxides or suboxides are not reduced. The product is ground, mixed with a similar quantity of the reducing agent, briquetted, and roasted at about 1,000°–1,100° C. The temperature is sufficient to reduce to the metallic condition, and to sinter the mass to a porous material which is a very active catalyst. In one example a catalyst is produced from a mixture of ferric oxide 32 parts, nickel oxide 7·5 parts, carbon 5·5 parts, ferrous oxalate 40 parts, and nickel oxalate 15 parts. Some aluminium may also be added to effect the final reduction.

209,441. TITANIUM COMPOUNDS. C. Weizmann and J. Blumenfeld, 16, Addison Crescent, London, W.14. Application date, July 12, 1922.

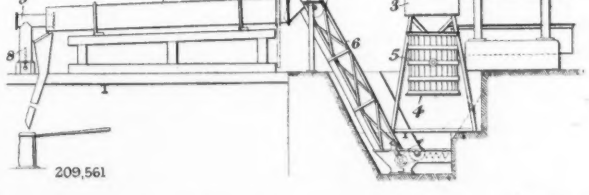
The object is to obtain the separation of titanium compounds from minerals, *e.g.*, ilmenite, by a process similar to that described in Specification No. 159,532 (see THE CHEMICAL AGE, Vol. IV, p. 426). The process consists mainly in treating the mixture resulting from the decomposition of the mineral with sulphuric acid with a limited quantity of water while maintaining it at a temperature near its boiling point until the titanium oxide is precipitated. The ferrous sulphate may be crystallised from the mother liquor after removal of the titanium. The quantity of water added to the original mixture is not materially greater than that necessary to make a saturated solution of salts at the temperature employed. About 85 to 94 per cent. of the titanium oxide is precipitated. The iron in solution is maintained as a ferrous salt during the operation by the addition of iron. The titanium oxide thus obtained contains less than 1 per cent. of impurities. In an example 1 kilo of ilmenite is treated with 1 kilo of 95 to 96 per cent. sulphuric acid and 200 cc. of water. The mixture is heated to 160° C. for a few hours, and about 3 litres of water then added, together with finely divided metallic iron to reduce the ferric salts. This water may be partly added as water of crystallisation in hydrated ferrous sulphate, to reduce the subsequent evaporation. The liquid is covered with a layer of paraffin to prevent evaporation. The solution and the precipitated titanium oxide are decanted from the mineral while hot, and the titanium oxide is filtered out. A residue of 350 to 400 grams of ilmenite is obtained and returned to the process ; the solution (4 litres) contains 5·15 grams of titanium oxide per litre, and the precipitate (600 to 700 grams) contains 45 per cent. of titanium oxide. About 90 per cent. of the sulphuric acid employed for the decomposition is recovered, partly as free acid and partly as ferrous sulphate.

209,547. NEW AZO COLOURING MATTER OF THE PYRAZOLONE SERIES. L. B. Holliday and Co., Ltd., and J. A. Stokes, Deighton Chemical Works, Huddersfield. Application date, November 17, 1922.

A mixture of 2 : 5-dichloraniline 4-sulphonic acid and soda ash is boiled, filtered, acidified with hydrochloric acid, and diazotised. The diazo solution is run into an ice cold solution of 1-p-sulphophenyl-3-methyl-5-pyrazolone and soda ash and the precipitated dyestuff filtered.

209,561. NEUTRALISING AMMONIUM SULPHATE. T. Nicholson, The Red House, Willington, Durham. Application date, November 24, 1922.

The object is to obtain neutral ammonium sulphate in the form of a relatively coarse granular product. The ammonium sulphate sludge is run into trays 2, 2*a*, and then into a centrifugal drier 3. The water content is reduced below 2 per cent. in the drier, and the crystals discharged into a vessel 4. The



necessary amount of strong aqueous ammonia is then added to neutralise the crystals and the vessel rotated about the horizontal axis 5. The neutral crystals are then transferred by conveyor 6 to a rotary drier 7, consisting of a slightly inclined cylinder. The crystals pass downwards through the drier and a

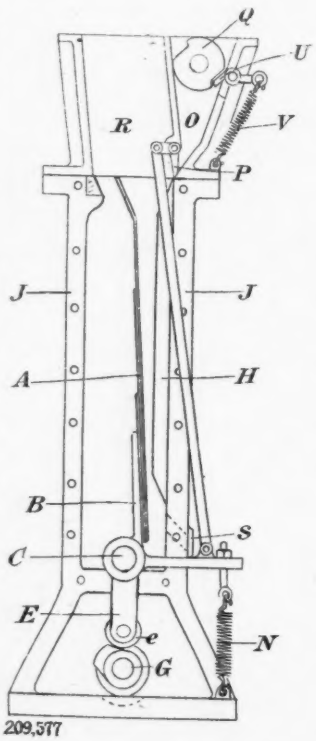
current of hot air is passed through the drier in the opposite direction from the pipe 9. The process is particularly suitable for treating the larger crystals obtained by the indirect process, since the crystals are obtained dry, neutral and substantially unbroken. Crystals obtained by the direct or semi direct processes may also be treated, but in this case the mass of crystals is preferably divided by baffles. The neutralising agent may alternatively be a concentrated solution of soda ash or solid soda ash.

209,569.—Dyeing of Animal Fibres. Morton Sundour Fabrics, Ltd., Dentonhill, Carlisle, and J. Thomas, Kingarth, Polmont, Stirlingshire, Scotland. Application date, December 2, 1922.

In the dyeing of animal fibres by the caustic soda sodium hyposulphite vat process, it is necessary to reduce the alkalinity to avoid the harmful effect of caustic soda on the fibres. In this invention, the alkalinity is partly neutralised by adding a weak acid such as benzoic acid, malic acid, phthalic acid or anhydride, phosphoric acid, or a tar acid such as cresol or phenol. Sufficient acid is added to reduce the alkali present to about 0·25 per cent. In an example, a dye vat may be composed of water 200 gallons, caustic soda 10 lbs., hydrosulphite powder 10 lbs., caledon brilliant purple R.R. 10 lbs., and benzoic acid 15·5 lbs. In the case of some vat colours such as caledon yellow 3G, caledon red B.N., and caledon brown K.T., less caustic soda is required to bring them into solution, and the quantity of benzoic acid is correspondingly reduced. Other examples are given using phthalic anhydride, phosphoric acid, ortho-cresol, and a mixture of phthalic anhydride and ortho-cresol.

209,577.—Pulverising Machine for Pulverising or Refining Minerals or Other Materials into Fine Powder. J. F. Holmes, 49, Walliker Street, Kingston-on-Hull. Application date, December 7, 1922.

This machine is for reducing or refining already reduced minerals or other materials into very fine powder. A beater *A* is carried by a metal arm *B* mounted on a shaft *C*, which also carries a lever *E* having a roller *e* at its lower end. The beater *A* is oscillated by a rotating cam *D* which co-acts with the roller *e*. The beater *A* operates against the metal plates, and the material to be treated is fed between the two. The beater *A* is normally held against the plate *H* by a spring arrangement such as *N*, and the beater is preferably formed of a number of flat strips of steel. The feeding hopper *O* is provided with a shutter *P*, which is opened and closed mechanically by an arrangement of links as shown. A roller *Q* co-acts with a small pivotted beater *U* so that the material is distributed and fed uniformly into the machine in a quantity which is determined by the tension of springs *V*. The pulverised product is delivered through the conduit *R* by natural draught, or by air entering through openings *S*.



209,577

209,694.—Chlorination of Hydroxy Anthraquinones. J. Thomas and Scottish Dyes, Ltd., Murrell Hill Works, Carlisle. Application date, July 8, 1922.

The process is for the chlorination of 1-hydroxy-anthraquinone and the conversion of the products according to their composition into quinizarine or chlor-quinizarine without isolation of intermediate products. 1-hydroxy-anthraquinone is dissolved in sulphuric acid of 94–100 per cent. strength containing 0·1 part of iodine. Chlorine is then passed through at 75° C. until the necessary increase in weight is obtained—*i.e.*, 13·7–14 per cent. The chlorination is then stopped, and 1-hydroxy-4-chloranthraquinone is obtained. Boric acid is then added, and the mixture heated to 180° C., so that quinizarine—*i.e.*, 1 : 4-dihydroxy-anthraquinone—is obtained by hydrolysis and precipitation by water. To obtain leuco-quinizarine, the sulphuric acid melt from the hydrolysis is treated with aluminium powder, and the leuco-quinizarine isolated by pouring into water, filtering, and drying. The chlorination of the 1-hydroxy-anthraquinone may be continued till it contains 24 per cent. of chlorine and has a melting point above 190° C. This then hydrolysed after adding boric acid, to obtain chlor-quinizarine (1 : 4-dihydroxy 2-chloranthraquinone). This process may also be applied to other hydroxy-anthraquinones containing one hydroxy group in the alpha position—*e.g.*, the dihydroxy-anthraquinone obtained from autoclaving with milk of lime of the residual sulphonic acids that are obtained in the production of α-sulphonic acid of anthraquinone by sulphonation in the presence of mercury. Several detailed examples of the preparation of these products are given.

209,697. Synthetic Resins and Process of Making the Same. A. E. Alexander, London. From J. S. Stokes, Spring Valley Farms, Montgomery Co., Pa., U.S.A. Application date, August 11, 1922.

Specification No. 208,193 (see The Chemical Age, Vol. X, p. 71) describes the production of synthetic resins which are soluble and capable of reacting further, or insoluble and infusible according to their treatment. These resins are made by condensing a suitable carbohydrate, preferably a polyose, with phenol and a methylene hardening agent such as hexamethylene tetramine or formaldenhyde. The phenol may be replaced by urea and the mixture is subjected to the action of heat or combined heat and pressure as described in Specification No. 208,193. In an example, the resin is obtained from a mixture of urea 100 parts, dry anhydrous corn starch 100 parts, a mineral acid catalyst such as sulphuric acid of 50 per cent. strength 5 parts. The condensation is effected as described, and a methylene hardening agent may subsequently be incorporated.

209,458. Regenerator Furnaces. J. J. Toogood, "The Poplars," Elland, Yorks, and Robert Dempster and Sons, Ltd., Rose Mount Iron Works, Elland, Yorks. Application date, September 13, 1922.

The regenerator is constructed of staggered vertical tubes of extra large cross sectional area both for waste heat and secondary air. The tubes are rectangular in cross section and are arranged in contact so that the heat passes through two thin walls to reach the secondary air. The two adjacent rows of air and waste gas tubes are slightly displaced so that the joints of one series are covered by the walls of the adjacent series. If a fire crack develops in one tube it is covered by the thin wall of the adjoining tube. The secondary air inlets are situated at a lower level than that of the waste heat dampers, so that the maximum depth of heated brickwork is vertically traversed by the secondary air.

Note.—Abstracts of the following specifications which are now accepted, appeared in the Chemical Age when they became open to inspection under the International Convention :—193,030 (A. J. M. Rialland) relating to separation of mixed liquids of different volatility, see Vol. VIII., p. 434 ; 195,590 (Soc. Anon. J. Cockerill), relating to tunnel furnaces for metallurgical uses, see Vol. VIII., p. 600 ; 196,585 (Henkel et Cie and W. Weber), relating to the treatment of ammonium chloride lyes in iron vessels, see Vol. VIII., p. 677.

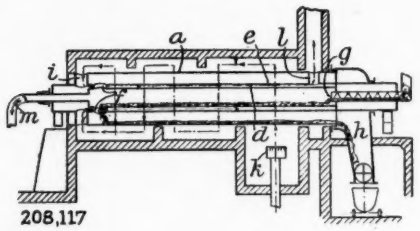
International Specifications not yet Accepted

208,114. Potassium Nitrate. J. Michael and Co., 2, Mittelstrasse, Berlin. International Convention date, December 7, 1922.

Potassium nitrate is obtained from sodium nitrate by a cyclic process. An excess of sodium nitrate is added to a boiling solution of potassium sulphate, and the sodium sulphate precipitated is removed while hot. Potassium nitrate is then crystallised from the liquor by cooling to 17° C., and further quantities of potassium sulphate and sodium nitrate are dissolved in the liquor to repeat the process.

208,117. DRY DISTILLATION. A Rühr, 6, Wodanplatz, Nurnburg, Germany. International Convention date, December 7, 1922.

Coal, etc., to be distilled is fed by a conveyor *g* into an inner drum *d* of a rotary retort, and passes through this drum to



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openings *f* at the other end, through which it falls into the outer retort *a*. The drum *d* is surrounded by an outer sleeve *e*, and the heating gases pass from the burner *k* around the retort *a*, through the openings *i* to the annular space between *d* and *e*, and thence through the openings *l* to the outlet. Gases are drawn off by the pipe *m* and the residue at the outlet *h*.

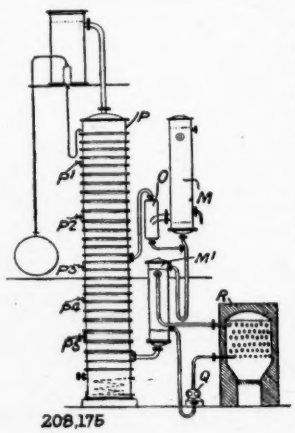
208,123. ALUMINIUM, OXIDE AND NITRATE; AMMONIUM FORMATE; CALCIUM ALUMINATE; NITRATES; NITROGEN; SULPHUR DIOXIDE. N. F. O. Palacin, 6, Rue Lauria, Barcelona, Spain. International Convention date, December 5, 1922.

Carbon dioxide and carbon monoxide are produced by burning carbon in air, and the dioxide is absorbed as bicarbonates and calcium carbonate. The monoxide is combined with ammonium bicarbonate to obtain ammonium formate, and the remaining nitrogen is absorbed by siliceous or aluminous earths in a rotary furnace. Aluminium nitride thus obtained may be oxidised to the nitrate, which may be converted into alumina and calcium aluminate. The nitrides may be used to obtain ammonia, which is converted into its salts, or nitric acid. Sulphur may be used in place of carbon, to obtain sulphates and bisulphates.

208,143. SYNTHETIC DRUGS. Haco-Ges. Akt. Ges. Bern, 4, Schanzenstrasse. Berne, Switzerland. Assignees of Haco-Ges., Berne, Switzerland. International Convention date, December 9, 1922.

Antiseptics are obtained by treating albumens such as yeast albumen, yeast nucleins, nuclenic acids, blood albumen, or casein with organic arsenic compounds such as dioxy-diamino-arsenobenzene, arsenilic acid, or acetylarsanilic acid. In an example, yeast is treated with the sodium salt of 4 : 4′-dioxy-3 : 3′-diamino-arsenobenzene-monomethylene-sulphuric acid, or arsanilic acid.

208,175. DISTILLING HYDROCARBONS, ETC. Soc. des Etablissements Barbet, 5, Rue de l'Echelle, Paris. International Convention date, December 11, 1922.



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Liquids such as hydrocarbon oils, phenols, cresols, chlorobenzols, nitrobenzols, etc., are supplied to the upper end of a tubular boiler M, the vertical tubes of which have slotted extensions above the upper tube plate. The liquid trickles down the tubes and vapour and liquid pass into a separator O, from which the vapour passes into a column P. The liquid passes to another boiler M^1 heated by superheated steam from a superheater R, and the liquid and vapour pass into the base of the column P. Valves P^1. . . . P^5 are provided at different levels to draw off different fractions.

208,162. DYES. Durand and Huguenin Aktl-Ges., Basle, Switzerland. International Convention date, December 11, 1922.

Tetrazotized benzidine or tolidine 2 : 2′ disulphonic acid is coupled with two molecular proportions of the xylenol carboxylic acid of the constitution OH : COOH : CH_3 : CH = 1 : 2 : 3 : 5 to obtain disazo-dyes which give yellow-brown shades with a chrome mordant.

LATEST NOTIFICATIONS.

210,734. Sulphur furnace for the production of sulphur dioxide by burning sulphur in an elementary state by means of nozzle burners. Metallbank und Metallurgische Ges. Akt.-Ges. January 31, 1923.

210,742. Process of obtaining pure anthracene and carbazol from crude anthracene. Weil, L., and Chemische Fabrik in Billwärder vorm. Hell and Sthamer Akt.-Ges. January 30, 1923.

210,748. Manufacture of gelatin suitable for emulsions. Elektro-Osmose Akt.-Ges. (Graf Schwerin Ges.). January 31, 1923.

210,772. Solid-fuel pulverisers. Soc. Anon. pour l'Utilisation des Combustibles. February 2, 1923.

210,785. System for treating activated sludge. Sando, W. J. February 5, 1923.

210,797. Process of and apparatus for the dry distillation of bituminous fuel. Syndikat für Gasforschung. February 1, 1923.

Specifications Accepted, with Date of Application

183,830. Phenolic condensation products and manufacture thereof. Shawinigan Laboratories, Ltd. July 25, 1921.

195,947. Iron chloride lyes, Process for treating. Henkel et Cie, and W. Weber. April 4, 1922.

210,102. Hydrogen and oxygen, Manufacture of. J. P. Scott. July 25, 1922.

210,114. Benzol contained in coal gas, Process and apparatus for recovering. J. E. Aguillon. September 19, 1922.

210,120. β-naphthol-2 : 3 : 6 : and 2 : 6 : 8 : disulphonic acids, Manufacture of. C. L. Masters. September 27, 1922.

210,131. Hydrocarbons of relatively low boiling point, Process of producing. E. C. R. Marks. (*Chemical Research Syndicate, Ltd.*) October 17, 1922.

210,133. Ores, concentrates and other granular materials, Process of and apparatus for use in drying. G. Rigg and W. J. McBride. October 17, 1922.

210,153. Lime, Manufacture of. W. L. H. Roberts. October 25, 1922.

210,154. Portland cement compositions. W. L. H. Roberts. October 25, 1922.

210,217. Azo dyestuffs, Manufacture of. A. G. Bloxam. (*Chemische Fabrik Griesheim-Elektron.*) November 23, 1922.

210,245. Froth-flotation test apparatus. H. L. Sulman and H. F. K. Picard. December 15, 1922.

210,307. Emulsions, suspensions, and similar disperse systems, Continuous production of. C. A. Agthe. March 1, 1923.

210,317. Carbon residues of distillation retorts, Utilisation of. G. E. Heyl. March 17, 1923.

210,347. Azo dyestuffs, Manufacture of. A. G. Bloxam. (*Chemische Fabrik Griesheim-Elektron.*) June 1, 1923. Addition to 210,217.

210,356. Gas from coal and/or other carbonaceous solids and/or materials, Process of the manufacture of. M. W. Travers and F. W. Clark. June 29, 1923. Addition to 198,777.

210,363. Colloidal sulphur, Process for the manufacture of. H. Vogel. July 14, 1923. Addition to 202,613.

210,366. Bauxite cement free from metallic impurities, and products resulting therefrom, Process for the manufacture of. L. G. Patrouilleau. July 23, 1923.

210,369. Porous iron, Process for manufacturing. K. Katsumori. August 13, 1923.

Applications for Patents

Badische Anilin und Soda-Fabrik and Johnson, J. Y. Manufacture of methyl alcohol, etc. 3,326. February 8.

Barber, T. W. Manufacture of lac. 3,307. February 8.

Bishop, C. A. Filter-presses. 3,162. February 7.

Colloisil Colour Co., Ltd., and Eberlein, W. Manufacture of silicates of the basic dyestuffs. 3,249. February 7.

Edser, E., and Marshall, J. S. Paints. 3,364. February 8.

Farbwerke vorm. Meister, Lucius, and Brüning. Manufacture of sulpho-benzyl ethers of resinous condensation products from phenols. 3,237. February 7. (Germany, February 7, 1923.)

Hanna, G. F. Manufacture of carbon black. 3,135. February 6.

Hydro-Carbon Distillation Syndicate, Ltd., and Knapp, W. Distillation of oils, etc. 3,115. February 6.

Koppers' Coke Oven Co., Ltd., and Koppers, H. Continuously distilling liquid hydrocarbons. 3,446. February 9.

Scottish Dyes, Ltd., Thomas, J., and Thomson, R. F. Dyestuffs. 3,021. February 5.

Soc. Chimique des Usines du Rhone. Manufacture of calcium arsenate. 3,230. February 7. (France, April 27, 1923.)

Soc. de Stéarinerie et Savonnerie de Lyon. Manufacture of cellulose esters. 3,112. February 6. (France, July 31, 1923.)

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

London, February 14, 1924.

BUSINESS has been fairly active this week, although many orders are for relatively small quantities.

Prices generally are firm, and the tendency is upwards.

Export business is fairly satisfactory, and a good volume of inquiry is in evidence.

General Chemicals

ACETONS is scarce and without change in value.

ACID ACETIC continues its strong position and the demand is good.

ACID CITRIC is unchanged.

ACID FORMIC is very scarce on the spot, and the price is nominal.

ACID LACTIC is also extremely firm and in short supply.

ACID OXALIC is without change in value and in moderate request.

ACID TARTARIC is only in poor request and price nominally unchanged.

BARIUM CHLORIDE is in better demand and price firm.

BLEACHING POWDER is unchanged.

FORMALDEHYDE is steadier and in better request.

LEAD ACETATE very firm and demand good.

LIME ACETATE is well inquired for and price without change.

LITHOPONE is only moderately active, but price is inclined to go higher.

METHYL ALCOHOL continues firm, with a good business passing.

POTASSIUM CARBONATE and CAUSTIC are in good demand, and prices are higher.

POTASSIUM PERMANGANATE is in fair request without change in value.

POTASSIUM PRUSSIATE is much higher and the demand has improved.

SODIUM ACETATE is firm and inclined to go higher.

SODIUM BICHROMATE is unchanged.

SODIUM NITRATE is in short supply and price very firm.

SODIUM PHOSPHATE has been in better request and price without change.

SODIUM PRUSSIATE is much higher, and the demand now shows a tendency to broaden, and an advance in price is not unlikely.

Pharmaceutical Chemicals

ACETANILID.—Unchanged, with firm undertone.

ACETYL SALICYLIC ACID is steady and continues in good demand.

ACID SALICYLIC is easy.

BROMIDES are firmly held. Stocks in second hands, here and on the continent, are apparently still considerable, and keep the prices in check. A further advance in bromine is not unlikely, and must in due course lead to higher costs to manufacturers of bromides when deliveries contracted for on the old basis are exhausted.

CALCIUM LACTATE tends to harden.

HEXAMINE is firmer.

MERCURIALS.—Manufacturers have reduced their quotations.

PHENACETIN has been quiet, prices being cut by some dealers, although the general position seems sound.

PHENAZONE is in buyers' favour owing to poor demand. Manufacturers' prices are maintained.

SALOL is very firm, being in demand for export. Manufacturers are sold well ahead.

SANTONINE has advanced.

SODA SALICYLATE is in good demand, with prices well maintained.

Coal Tar Intermediates

Business has been somewhat quiet in this market during the past week, and there is nothing of signal interest to report.

ALPHA NAPHTHOL is unchanged.

ALPHANAPHTHYLAMINE has been inquired for and the price remains steady.

ANILINE OIL has been of less interest than of late.

ANILINE SALT.—Some home business has been placed.

BENZIDINE BASE.—Small business has been received for home account.

BETA NAPHTHOL has been inquired for on export account.

DIMETHYLANILINE is without special feature.

DIPHENYLAMINE.—The price continues firm.

"H" ACID.—Some home trade business has been passing.

NITROBENZOL continues to pass regularly into consumption.

PARANITRANILINE has been inquired for on both home and export account.

"R" SALT is without special feature.

XYLIDINE has been of small interest.

Coal Tar Products

There is no great change in the position of the market for coal tar products from last week. Water white spirits are slightly stronger, and creosote oil is, if anything, slightly easier.

90% BENZOL.—The market is somewhat upset owing to the rise in price of petrol, and the price to-day is in the region of 1s. 6d. per gallon on rails.

PURE BENZOL is to-day worth about 1s. 7od. per gallon on rails.

CREOSOTE OIL is hardly so firm, and is quoted at 8½d. to 8¾d. per gallon on rails in the North, while the price in the South is from 9¼d. to 9½d. per gallon.

CRESYLC ACID is quoted at 1s. 1od. per gallon on rails for the pale quality, 97-99%, and the dark quality, 95-97%, is quoted at 1s. 6d. to 1s. 8d. per gallon.

SOLVENT NAPHTHA is stronger, and is worth about 1s. to 1s. 1d. per gallon on rails.

HEAVY NAPHTHA is quoted at about the same figure.

NAPHTHALENES are unchanged from last week, the lower qualities being quoted at about £7 to £7 10s. per ton, the 74-76 quality being worth about £8 to £8 10s. per ton and 76-78 quality £9 to £9 10s. per ton.

PITCH remains very weak and the downward tendency of prices continues. To-day's values are nominally:—East Coast 50s. to 55s., f.o.b., London 55s. to 60s. f.o.b.

Sulphate of Ammonia

The demand for export remains satisfactory, and prices are well maintained.

Corporation Profits Tax

THE agitation to abolish the Corporation Profits Tax in the forthcoming Budget, to which we called attention last week, has aroused considerable interest among those concerned. It is fundamental that if trade is to revive and unemployment to be mitigated all vexatious and useless taxation of business enterprise must be got rid of at once. That is why we say that the Corporation Profits Tax, a purely war-time measure, should share the same fate as the Excess Profits Tax and be eliminated from the Statute Book.

We have never heard an argument in its favour and many against. For one thing it bears severely and unjustly upon Limited Liability Companies. It places them at a disadvantage by comparison with other forms of trading concerns and is a very serious clog on the development of Joint Stock Companies which have played so important a part in commercial progress and expansion during the past quarter of a century.

The British Chamber of Commerce has this year taken action to call the attention of Mr. Philip Snowden, the Chancellor of the Exchequer, to this tax, which the Chamber says "operates inequitably as between businesses and is an undue burden upon industry." Increased pressure brought to bear upon the Chancellor within the next few weeks will prove successful, and no trade association should neglect the new opportunity that presents itself to raise its voice against a most irritating and burdensome tax which ought to have been abolished long ago.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	80	0	0	to	85	0	0
Acetone, pure	ton	120	0	0	to	123	0	0
Acid, Acetic, glacial, 99–100%	ton	73	0	0	to	74	0	0
Acetic, 80% pure	ton	50	0	0	to	52	0	0
Acetic, 40% pure	ton	26	0	0	to	27	0	0
Arsenic, liquid, 2000 s.g.	ton	85	0	0	to	88	0	0
Boric, commercial	ton	48	0	0	to	52	0	0
Carbolic, cryst. 39–40%	lb.	0	0	11	to	0	0	11½
Citric	lb.	0	1	5	to	0	1	5½
Formic, 85%	ton	65	0	0	to	68	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol	ton	39	0	0	to	40	0	0
Lactic, 60 vol	ton	45	0	0	to	47	0	0
Nitric, 80 Tw	ton	23	0	0	to	25	0	0
Oxalic	lb.	0	0	5¾	to	0	0	6
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9½	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	0½	to	0	1	1
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	23	0	0	to	24	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	30	0	0	to	32	0	0
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	32	0	0	to	33	0	0
Nitrate (pure)	ton	40	0	0	to	45	0	0
Phosphate	ton	63	0	0	to	65	0	0
Sulphocyanide, commercial 90%	lb.	0	1	1	to	0	1	3
Amyl acetate, technical	ton	280	0	0	to	300	0	0
Arsenic, white powdered	ton	66	0	0	to	68	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	14	10	0	to	15	0	0
Nitrate	ton	37	0	0	to	40	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	0	0	to	10	10	0
Borax crystals, commercial	ton	25	0	0	to		—	
Calcium acetate, Brown	ton	13	0	0	to	14	0	0
Grey	ton	22	0	0	to	23	0	0
Carbide	ton	13	0	0	to	13	10	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	80	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	25	0	0	to	25	10	0
Cream Tartar, 98–100%	ton	84	0	0	to	86	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol	ton	63	0	0	to	64	0	0
Formusol (Rongalite)	lb.	0	1	11	to	0	2	0
Glauber salts, commercial	ton	4	0	0	to	4	10	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols	gal	0	2	0	to	0	2	1
Iron perchloride	ton	20	0	0	to	22	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	46	0	0	to	48	0	0
Carbonate (White Lead)	ton	50	0	0	to	52	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	37	0	0	to	39	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	3	10	0	to	3	15	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	5	15	0	to	6	0	0
Sulphate (Druggists')	ton	8	0	0	to	9	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	48	0	0
Methyl acetone	ton	82	0	0	to	85	0	0
Alcohol, 1% acetone	ton	80	0	0	to	85	0	0
Nickel sulphate, single salt	ton	37	0	0	to	38	0	0
Ammonium sulphate, double salt	ton	37	0	0	to	38	0	0
Potash, Caustic	ton	33	0	0	to	34	0	0
Potassium bichromate	lb.	0	0	5¾	to		—	
Carbonate, 90%	ton	30	0	0	to	31	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to		—	
Metabisulphite, 50–52%	ton	63	0	0	to	65	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	10	to	0	0	10½
Prussiate, red	lb.	0	2	6	to	0	2	8
Prussiate, yellow	lb.	0	0	9½	to	0	0	10
Sulphate, 90%	ton	10	0	0	to	10	10	0
Salammoniac, firsts	cwt.	2	15	0	to		—	
Seconds	cwt.	2	17	6	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to		—	
Bisulphite, 60–62%	ton	20	0	0	to	22	0	0
Chlorate	lb.	0	0	2¾	to	0	0	3
Caustic, 70%	ton	17	10	0	to	18	0	0
Caustic, 76%	ton	18	10	0	to	19	0	0
Hydrosulphite, powder	lb.	0	1	6	to	0	1	7
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	31	0	0	to	32	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	11	to	0	1	0
Prussiate	lb.	0	0	5¾	to	0	0	6
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62%	ton	15	0	0	to	16	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	1	0	to	0	1	1
Tin perchloride, 33%	lb.	0	1	1	to	0	1	2
Perchloride, solid	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	9	to	0	4	0
Acetanilid	lb.	0	3	0	to	0	3	3
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	10	to	0	3	3
Salicylic, B.P.	lb.	0	2	4	to	0	2	6
Tannic, leviss	lb.	0	3	0	to	0	3	3
Amidol	lb.	0	7	6	to	0	8	0
Amidopyrin	lb.	0	14	0	to	0	14	6
Ammon ichthosulphonate	lb.	0	1	10	to	0	2	0
Barbitone	lb.	0	17	0	to	0	17	6
Beta naphthol resublimed	lb.	0	3	0	to	0	3	6
Bromide of ammonia	lb.	0	0	10½	to	0	1	0
Potash	lb.	0	0	8½	to	0	0	9
Soda	lb.	0	0	9½	to	0	0	10
Caffeine, pure	lb.	0	12	3	to	0	12	9
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	2	0	to	0	2	3
Calomel	lb.	0	3	4	to	0	3	6
Chloral hydrate	lb.	0	4	0	to	0	4	3
Cocaine alkaloid	oz.	1	2	0	to	1	2	6
Hydrochloride	oz.	0	17	0	to	0	17	6
Corrosive sublimate	lb.	0	2	10	to	0	3	0
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	2	4	to	0	2	6
B.P. (75–80% eucalyptol)	lb.	0	2	5	to	0	2	7
Guaiacol carbonate	lb.	0	13	0	to	0	13	3
Liquid	lb.	0	11	6	to	0	12	0
Pure crystals	lb.	0	12	6	to	0	13	0
Hexamine	lb.	0	4	0	to	0	4	3
Hydroquinone	lb.	0	4	3	to	0	4	6
Lanoline anhydrous	lb.	0	0	7	to	0	0	6
Lecithin ex ovo	lb.	1	5	0	to	1	7	6
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	3	0	to	0	3	6
Metol	lb.	0	9	0	to	0	10	0
Milk sugar	cwt.	4	5	0	to	4	10	0
Paraldehyde	lb.	0	1	7	to	0	1	9
Phenacetin	lb.	0	7	3	to	0	7	6
Phenazone	lb.	0	8	0	to	0	8	6
Phenolphthalein	lb.	0	8	0	to	0	8	3
Potassium sulpho guaiacolate	lb.	0	6	3	to	0	6	9
Quinine sulphate, B.P.	oz.	0	2	3	to		—	

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	6	0	to	0	6	6
Salicylate of soda powder	lb.	0	3	0	to	0	3	3
Crystals	lb.	0	3	0	to	0	3	3
Salol	lb.	0	4	0	to	0	4	3
Soda Benzoate	lb.	0	3	6	to	0	3	9
Sulphonal	lb.	0	17	0	to	0	18	0
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	12	0	to	0	12	3
Soda salicylate	lb.	0	8	6	to	0	9	0
Vanillin	lb.	1	4	6	to	1	5	6

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	1	9	to	0	2	0
Refined	lb.	0	2	3	to	0	2	6
Alphanaphthylamine	lb.	0	1	6½	to	0	1	7
Aniline oil, drums extra	lb.	0	0	8½	to	0	0	8¾
Salts	lb.	0	0	9	to	0	0	9¼
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	9	to	0	3	0
Benzidine, base	lb.	0	4	6	to	0	4	9
Sulphate	lb.	0	3	6	to	0	3	9
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Crocein Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	3	to	0	1	4
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	8	to	0	2	10
Diphenylamine	lb.	0	3	3	to	0	3	6
H-Acid	lb.	0	4	6	to	0	4	9
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	4	to	0	2	6
Naphthionate of Soda	lb.	0	2	4	to	0	2	6
Naphthylamine-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	9	to	0	0	10
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	9	to	0	0	10
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	c.i.f. 1/9 spot	0	1	10
Bay	easier	0	10	6
Bergamot	dearer	0	14	6
Cajuput		0	3	3
Camphor, white	per cwt.	3	15	0
Brown	„	3	10	0
Cassia	c.i.f. 6/3 spot	0	8	9
Cedarwood		0	1	6
Citronella (Ceylon)	firmer, c.i.f. 3/0 spot	0	3	6
(Java)	very firm, c.i.f. 4/4 spot	0	4	8
Clove		0	9	0
Eucalyptus		0	2	4
Geranium Bourbon	easier	1	11	0
Lavender		1	5	0
Lavender Spike	firm	0	4	6
Lemon		0	3	0
Lemongrass	per oz.	0	0	2¾
Lime (distilled)		0	4	6
Orange sweet (Sicilian)		0	11	6
(West Indian)		0	9	6
Palmarosa		0	18	0
Peppermint (American)		0	16	0
Mint-(dementholised Japanese)	firmer	0	13	6
Patchouli		1	5	0
Otto of Rose	per oz.	1	15	0
Rosemary		0	1	11
Sandalwood		1	5	0
Sassafras		0	10	6
Thyme	2/6 to	0	8	0

Synthetics.		£	s.	d.
Benzyl acetate	per lb.	0	3	3
Benzoate	„	0	3	6
Citral	„	0	10	0
Coumarine	„	1	0	0
Heliotropine	„	0	8	0
Ionone	„	1	5	0
Linalyl acetate	„	1	2	6
Methyl salicylate	easier „	0	3	0
Musk xylol	„	0	18	0
Terpeniol	„	0	2	9

Large Orders for "Lopulco" Plant

THE Union d'Electricite, which owns power stations at Gennevilliers and Vitry near Paris for the supply of electric power to the city and its environs, has placed a large order for pulverised fuel plant with the company associated with Vickers and International Combustion Engineering, Ltd., of London, for the power station at Gennevilliers. This is now worked with B. and W. and Stirling boilers having multiple-retort and chain-grate stokers. For the new extension the engineers of the Union d'Electricite have decided upon Ladd-Belleville boilers and Lopulco plant for pulverised fuel firing, and this decision is significant in view of the fact that the mechanical stokers already working in the station represent the very last word in modern practice.

The following are some leading particulars of the new contract :—Four boilers of Ladd-Belleville type, each of 19,500 sq. ft. heating surface, to work at 440 lb. per sq. in. and give 150,000 lb. of steam per hour at full load, also an overload of 240,000 lb. for two hours. This overload is only made possible by the boilers being fired with coal in powdered form. The fuels, on which the guarantees are given, show a wide variation, in one case of 11 per cent. of ash and 17 per cent. of volatiles and in the other 20 per cent. of ash and 8 per cent. of volatiles. The pulverised fuel plant will include 8 Lopulco gravity coal driers, 8 Raymond roller mills, each to grind 6 tons of coal per hour; 48 Lopulco variable speed feeders and also burners of fish-tail patterns. The combustion chamber of each boiler will be of the Combustion Co.'s special design, having air-cooled walls and ports to admit the pre-heated air to various parts of the flame to ensure complete combustion of the fuel. The chamber is also fitted with Lopulco water screen to prevent the ash from slagging and enable it to be easily handled.

One of the companies associated with Vickers and International Combustion Engineering, Ltd., has received a contract to equip the new power plant of the Société Metallurgique de Hoboken, near Antwerp, with boilers arranged to use pulverised coal and Lopulco equipment. This is the second large order recently placed in Belgium for such plant, the other being for a power station at Charbonnages de Beeringen in Limbourg, which has four Ladd boilers, each 7,000 sq. ft. heating surface, and enough pulverising plant to supply also 8 existing B. and W. boilers

Minerals in Northern Ontario

UP to the end of 1923 the mines of Northern Ontario have produced over 600 million dollars in gold, silver, platinum, nickel and copper. More than 250 million tons of ore and rock has been taken from the nickel-copper mines of the Sudbury district, yielding approximately 255 million dollars, and placing in ascertained reserves at least another 100 million tons of ore, with an indicated gross value of two billion dollars. The mines of the Cobalt, South Lorrain and Gowganda district have produced over 340 million ounces of silver valued at approximately 210 million dollars. Dividends from a great many of these silver mines have been exceedingly big—ranging from a few hundred per cent. to as high as twenty-five thousand per cent. on the capital invested.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.*

Glasgow, February 14, 1924.

Business in the heavy chemical market during the past week has been quiet, a moderate number of inquiries being received, but the number of orders booked small in proportion.

Stated prices are on about the same level as last reported, but in a number of cases orders can be placed at considerably less.

Industrial Chemicals

ACID ACETIC.—Glacial, 98/100%, £60 to £69 per ton; 80% pure, £51 to £53 per ton; 80% technical, £47 to £49 per ton, all packed in casks, delivered, c.i.f., U.K. ports, duty free.

ACID BORACIC.—Crystals or granulated, £48 per ton; powdered, £50 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—In little demand. Price now reduced to about 7d. per lb.

ACID CITRIC, B.P. CRYSTALS.—Unchanged at about 1s. 4½d. per lb., less 5% carriage paid.

ACID FORMIC 85%.—Spot material practically unobtainable and very high prices asked. Quoted £74 to £77 per ton, ex store spot delivery. Offered for early delivery at about £67 per ton, ex wharf.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID NITRIC 80°.—£23 10s. per ton, ex station, full truck loads.

ACID OXALIC.—Nominally 5½d. per lb., ex store, but could probably be obtained for less.

ACID SULPHURIC.—144°, £3 12s. 6d per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC B.P. CRYSTALS.—Spot lots quoted 1s. 1d. per lb., less 5% ex store. Offered for early delivery at 1s. per lb., less 5% ex wharf.

ALUMINA SULPHATE 17/18% Iron free.—Moderate inquiry. Spot lots £8 10s. per ton, ex store. Offered for forward delivery at about £7 7s. 6d. per ton, c.i.f. U.K. port.

ALUM, CHROME.—Potash chrome alum quoted about £27 per ton, ex station. Ammonium chrome alum about £20 to £21 per ton, ex store. Moderate inquiry for export.

ALUM, POTASH (LUMP).—Offered from the continent at about £10 per ton c.i.f. U.K. port. Spot lots quoted £10 15s. per ton, ex store.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 5d. per lb., ex station, prompt delivery.

AMMONIA CARBONATE.—Lump, £35 per ton; powdered, £37 per ton, packed in casks carriage paid U.K. station.

AMMONIA LIQUID 880°.—Unchanged at 3d. per lb., delivered, containers extra.

AMMONIA MURIATE.—Grey galvanisers quality offered at £31 to £32 per ton, ex station, spot delivery. Fine white crystals quoted £27 15s. per ton, ex store.

AMMONIA SULPHATE.—25½%, £13 10s. per ton; 25¾%, £14 13s. per ton, ex works, prompt delivery.

ARSENIC WHITE POWDERED.—Spot lots about £71 per ton, ex store. Offered for forward delivery at about £69 per ton, ex wharf.

BARIUM CARBONATE.—98/100% powdered, offered from the Continent at £12 10s. per ton, c.i.f. U.K. port.

BARIUM CHLORIDE 98/100%.—English material unchanged at about £15 per ton, ex store. Offered from the Continent at slightly less.

BARYTES.—Finest white English unchanged at £5 5s. per ton, ex works. Good quality continental material offered at £5 per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—Spot lots £11 per ton, ex station. Contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystal, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton, ex station. Offered from the continent at about £4 15s. per ton, c.i.f. U.K. ports.

COPPERAS GREEN.—Good export inquiry. Price about £3 10s. per ton, f.o.b. U.K. port, packed in casks.

COPPER SULPHATE.—In little demand. Price about £25 per ton, less 5% f.o.b. U.K. port.

FORMALDEHYDE 40%.—Moderate inquiry. Quoted £62 15s. per ton, ex store, spot delivery.

GLAUBER SALTS.—English material £4 per ton, ex store or station. Continental offering at about £3 5s. per ton, c.i.f. U.K. port.

LEAD, RED.—English manufacturers now quote £40 per ton, less 2½% carriage paid U.K. stations. Continental offered at about £38 10s. per ton, ex store, spot delivery. Offered for forward delivery at about the same figure.

LEAD, WHITE.—Continental material now offered at about £42 per ton, ex store, spot delivery.

LEAD ACETATE.—White crystals quoted £47 to £48 per ton, ex store, spot delivery. Offered from the continent at about £46 10s. per ton, c.i.f. U.K. port.

MAGNESITE CALCINED.—Finest English material offered at £8 per ton, ex station.

MAGNESIUM CHLORIDE.—Quoted £3 10s. per ton, ex store, spot delivery. Offered from the continent at about £3 5s. per ton, c.i.f. U.K. port.

MAGNESIUM SULPHATE (Epsom Salts).—Commercial quality offered at about £5 per ton, ex store. B.P. quality, £6 5s. per ton, ex station, prompt delivery.

POTASH, CAUSTIC, 88/92%.—Cheaper quotations from the continent. Now offered at about £27 10s. per ton, c.i.f. U.K. port. Spot lots quoted £31 to £32 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE 96/98%.—Quoted £24 per ton, c.i.f. U.K. ports, early delivery. Spot lots on offer at about £27 5s. per ton, ex store.

POTASSIUM CHLORATE.—Little inquiry. Spot lots unchanged at about 3½d. per lb., ex store.

POTASSIUM NITRATE (SALTPETRE).—Offered from the continent at £25 10s. per ton, c.i.f. U.K. port, prompt shipment. Spot lots on offer at about £31 10s. per ton, ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 10d. per lb., ex store, spot delivery. In little demand.

POTASSIUM PRUSSIATE (YELLOW).—Unchanged at about 9d. per lb., f.o.b. U.K. port for export. Spot material on offer at 9¼d. per lb., ex store.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62% broken, £19 2s. 6d. per ton; 98/99% powdered, £22 15s. per ton. All ex station, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Unchanged at about £25 per ton, ex store, spot delivery. Offered for early delivery at about 20s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised quality £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—English makers' price unchanged at 4½d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English makers' price about £10 per ton, ex station. Continental obtainable at about the same figure. Pea crystals quoted £15 per ton, ex store.

SODIUM NITRATE.—Refined 96/98% quality quoted £13 10s. per ton, f.o.r. or f.o.b. U.K.

SODIUM NITRATE 100%.—Quoted £26 10s. to £28 10s. per ton, according to quantity, f.o.b. U.K. port.

SODIUM PRUSSIATE (YELLOW).—Unchanged at about 5d. per lb., f.o.b. U.K. port for export. Spot material available at about 5¼d. per lb., ex store.

SODIUM SULPHATE (SALTCAKE).—Price for home consumption £4 5s. per ton, carriage paid stations. Good export inquiry.

SODIUM SULPHIDE.—60/62% solid, £15 per ton, ex station; broken, £1 per ton more; 31/34% crystals, £9 7s. 6d. per ton, ex station.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

TIN CRYSTALS.—Quoted 1s. 3½d. per lb., f.o.b. U.K. port.

TIN CHLORIDE 98/100%.—Quoted £26 per ton, f.o.b. U.K. port for export.

TIN SULPHATE.—English material offered at about £13 10s. per ton, ex store. Continental at about the same figure.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHOL SULPHO ACID 15.—Some export inquiry. Price 6s. 7d. lb., 100% basis f.o.b.

ALPHA NAPHTHYLAMINE.—Good export inquiries. Price 1s. 5d. lb., f.o.b.

ALPHA NAPHTHOL.—Some export inquiry. Price 2s. 6d. lb., f.o.b.

BETA NAPHTHYLAMINE.—Some home inquiries. Price 4s. lb., delivered.

BETA NAPHTHOL.—Export inquiry. Price 1s. 1d. lb., f.o.b.

DIMETHYLANILINE.—Large export demand. Price 2s. 5d. lb., f.o.b., drums included.

DI NITROBENZOL.—Export inquiry. Price 10½d. lb., f.o.b.

META TOLUYLENE DIAMINE.—Small export inquiry. Price 4s. 6d. lb., f.o.b.

NITROBENZOL.—Export inquiry. Price 8½d. lb., f.o.b., drums included.

ORTHO TOLUIDINE.—Export inquiry. Price 10d. lb., drums included.

PARA AMIDOPHENOL.—Small export demand. Price 8s. 6d. lb., 100% basis f.o.b.

R SALT.—Small demand. Price 3s. lb., delivered.

SCHAEFFER SALT.—Export inquiry. Price 4s. lb., 100% basis.

XYLIDINE.—Some export inquiry. Price 2s. 11d. lb., f.o.b., drums included.

Output of Potash in France

H.M. COMMERCIAL COUNSELLOR at Paris (Mr. J. R. Cahill) reports that according to the *Information Financiere* of February 7 the output of Alsatian potash during the years 1921–23 was as follows:—

	Metric tons.		
	1921.	1922.	1923.
Sylvinite, 12-16 per cent.	332,421	320,975	409,565
,, 20-22 per cent.	205,855	337,318	348,044
Chloride, 30-40 per cent.	18,268	59,608	110,153
,, 50-60 per cent.	90,252	126,866	158,278
Total	646,796	844,767	1,026,042
Pure potash	148,937	207,123	248,528

It will be seen that in 1923 there was an increase of about 20 per cent. in the output reckoned in pure potash and of more than 21 per cent. in the output of crude salts. The increase is particularly noticeable as regards chlorides, amounting to 25 per cent. in respect of chlorides with a content of 50 to 60 per cent. and of nearly 85 per cent. for those with a lower content.

Catalogues Received

J. KNIGHT AND HALE, LTD.—The latest improved design of the patent "K.W.H." oil engine is described in a catalogue issued by this firm from their works at Denton, Manchester. This engine, which is made in sizes from 4½ to 25 h.p., works on the low-compression two-cycle principle, and after starting up with a vaporiser the charge is automatically ignited. The whole construction of these engines is remarkably sound and robust.

HESCO, LTD.—We have received a number of illustrated leaflets from the above firm of Kingsway House, Kingsway, London, W.C.2, describing various interesting devices for mechanical handling. These comprise the "Hesco" barrel-stacking machine, "Hesco" lifting trucks and light petrol and electric trucks. All these have features of considerable interest and utility not always found in similar devices, and are well worth investigation by those interested in the question of saving labour and improving efficiency in their works.

The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, February 14, 1924.

A SATISFACTORY feature of the market here is the comparative steadiness of most lines of heavy chemicals. In some cases, indeed, the tone is quite firm, and in few instances can any important degree of weakness be reported. These remarks, however, do not apply to the coal-tar products, most of the articles in this group being decidedly weak. In chemicals a quietly steady business has been put through this week, and buyers have shown a rather readier disposition to purchase forward. Export demand is moderate and inquiries from abroad are reported.

Heavy Chemicals

Glauber salts continue rather quiet but current values are unchanged at £3 10s. to £3 15s. per ton. Saltcake still meets with a ready demand for shipment, though home trade business is on modest lines; the price for the latter is steady at £4 10s. per ton. Little or no improvement in hyposulphite of soda has been experienced since last report, and quotations are easy at £14 10s. per ton for photographic crystals and £9 10s. for commercial quality. Caustic soda keeps steady at from £16 17s. 6d. per ton for 60 per cent. to £19 7s. 6d. for 76-77 per cent. material; demand both from home users and for export is on a satisfactory scale. Bleaching powder is only moderately active, with values unchanged at £10 per ton. Sulphide of sodium continues quiet, with 60-65 per cent. concentrated solid now offering at £14 10s. per ton and crystals at round £9. Phosphate of soda attracts little attention, though quotations are fairly well held at £14 per ton. Prussiate of soda is still a dull section, with current values unchanged from last week at 5½d. per lb. Bichromate of soda is steady and in moderately active inquiry at 4½d. per lb. The demand for bicarbonate of soda is not too brisk; prices, however, are maintained at round £10 10s. per ton. Nitrite of soda is scarce and very firm at £28 10s. per ton. Soda crystals are steady but rather inactive at £5 5s. per ton. Chlorate of soda is quiet but unchanged at 2¾d. per lb. A steady demand for alkali is being met with, and 58 per cent. material keeps steady at about £7 per ton. Acetate of soda is not a busy section, though values are about maintained at £23 10s. per ton.

Caustic potash is quoted at about £31 per ton for 90 per cent. strength, a rather good demand being experienced. Carbonate of potash is also well held at £27 per ton for 88-92 per cent. Bichromate of soda is rather quiet at present, though current quotations show no change at 5¾d. per lb. Yellow prussiate of potash is now fairly steady at 8½d. to 8¾d. per lb., without, however, much apparent improvement in the demand. Permanganate of potash is weak and inactive at 8d. per lb. for commercial. Chlorate of potash is quiet but steady at round 3d. per lb.

Arsenic is well maintained at £67 to £68 per ton, Manchester, for white powdered, Cornish make; a rather good inquiry, more particularly on forward account, has been reported. Sulphate of copper is no livelier; to-day's value is easy at round £25 per ton, f.o.b. Acetate of lime keeps firm, offers for prompt or near delivery being scarce; grey is quoted at round £22 per ton and brown at £15. Acetate of lead is firmer at £47 for white and £46 per ton for brown. The demand for nitrate of lead continues quiet with values steady at £42 to £43 per ton. Commercial Epsom salts are unchanged at round £4 10s. per ton, with magnesium sulphate, B.P., on offer at £6 10s.

Acids and Tar Products

Tartaric and citric acids are both quiet, the former at 1s. 1½d. and citric at 1s. 4½d. per lb. Oxalic acid is also dull at 5½d. per lb. Acetic acid continues firm, commercial, 80 per cent. quality, offering at £48 per ton and glacial at about £70.

The outstanding feature of the coal-tar products section of the market during the past month or two has been the pronounced weakness, which in some cases has continued during the week. Pitch is very quiet and to-day's value is put at about £2 15s. per ton. Carbolic acid is more or less nominal at round 2s. per gallon for crude and 8d. per lb. for crystals. Creosote oil is in moderate demand at 9d. per gallon. Refined naphthalene is easy at £17 per ton and crude at £6 to £10. Solvent naphtha meets with little inquiry at 1s. per gallon.

Company News

INTERNATIONAL PAINT AND COMPOSITIONS, LTD.—A dividend is announced at the rate of 5 per cent. less tax on the ordinary shares for the year 1923.

THE WALL PAPER MANUFACTURERS, LTD.—The debenture register of the company will be closed from to-day (February 16) until February 29, both days inclusive, for the payment of the half-yearly interest to February 29.

LINOLEUM MANUFACTURING CO.—The directors have declared a final dividend for the year 1923 of 10 per cent., and a bonus of 10 per cent., making a total dividend for the year of 15 per cent. and a bonus of 10 per cent., both free of tax. For the preceding year the distribution was the same.

POWELL DUFFRYN STEAM COAL CO., LTD.—The directors recommend final dividends for the year 1923 at the rate of 3 per cent. less tax on the preference shares and the second preference shares, and 7½ per cent. free of tax on the fully-paid and partly-paid ordinary shares, payable on March 18.

UNITED TURKEY RED CO., LTD.—The directors recommend a dividend of 2½ per cent., free of tax, on the ordinary shares, placing £40,000 to reserve, and carrying forward £24,400. For 1921 and 1922 there was no dividend on the ordinary shares. Arrears of dividend on the second preference shares were paid in August last.

YORKSHIRE INDIGO, SCARLET AND COLOUR DYERS, LTD.—After providing for depreciation, etc., the trading profit for the year 1923 is £13,666, which, with £3,203 brought in, makes a total of £16,869. After paying debenture interest, the directors recommend a dividend on the preference and the ordinary shares at the rate of 7½ per cent. for the year less tax at 4s. 7½d. in the £ (same as the previous year), leaving £3,561 to be carried forward. The annual meeting will be held at Leeds on February 22 at 12 noon.

JOHN BOWER AND PARTNERS, LTD.—The directors have issued a circular to the shareholders stating that they are of opinion that the time has arrived when it is desirable that John Bowes and Partners, Ltd., should part with a substantial portion of its holding in Marley Hill Chemical Co., Ltd., and have decided to give to the shareholders and debenture holders of both companies the opportunity of purchasing a proportion of such holding. In view of the very satisfactory position shown in the last balance sheet and memorandum the directors do not feel justified in disposing of any of the shares held by them in the Marley Hill Chemical Co., Ltd., at less than par.

BORAX CONSOLIDATED, LTD.—The report of the directors to September 30 last states that the profits for the period, after providing for all management and administration expenses, amounted to £442,753 (against £417,900 for the previous year). Debenture interest and the interim dividends on the preferred and preferred ordinary shares took £126,240, and with £123,893 brought forward, there is £640,404 to be dealt with. A sum of £40,000 is again placed to depreciation reserve account, and the annual premium of £5,825 has been added to the debenture redemption sinking fund, leaving £394,581. It is proposed, after allowing for the final dividends on the preference and preferred ordinary shares, to pay a final dividend of 1s. 6d. per share on the deferred ordinary shares, making 12½ per cent. for the year, together with a bonus of 6d. per share, or 2½ per cent. Further, a sum of £25,000 is to be placed to general reserve, £15,000 is to be reserved for income tax accrued to September 30, and £5,000 is to be placed to pensions and grants fund. There will then remain a balance of £137,081 to be carried forward. The ordinary general meeting will be held at the Cannon Street Hotel on February 19, at 12 noon.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

OILS, CHEMICALS, DYES, ETC., FOR AUSTRALIA.—A Melbourne merchant has arrived in London, and is desirous of getting into touch with British manufacturers desiring representation in Australia. He is particularly interested in raw materials, such as oils, chemicals, dyes, etc., suitable for tanneries, woollen mills, soap and candle works, etc., and is prepared to act as buying agent in Australia for British Australian produce, *e.g.*, canned meats, meat works by-products, tallow, etc. Application should be made in the first instance to the Official Secretary, Commercial Bureau, Australia House, Strand, W.C.2, quoting Reference No. 412/7/1/1/210.

OILS AND FATS FOR DANZIG.—A firm of commission agents in Danzig desires to secure the representation for Danzig and Poland of British exporters of all kinds of colonial goods and oils and fats (edible and for soap making). (Reference No. 182).

PAINTS, OILS AND VARNISHES REQUIRED IN EGYPT.—The Commercial Secretary at Cairo reports that the Egyptian Ministry of War is calling for tenders for the supply of paints, oils, and varnishes required by the Frontier Districts Administration for the year 1924-1925. (Reference D.O.T. 12352 F.E./C.C.)

Contracts Open

Tenders are invited for the following articles. The latest dates for receiving tenders are, when available, given in parentheses:

LEEDS (March 4).—Supply of the following materials during the year ending March 31, 1925, for the Tramways and Highways Committee: Chemicals, acids, oils, paints, soaps, and metal polish, portland cement, etc. Specifications, conditions of contract and forms of tender may be obtained on application to the General and Commercial Manager.

DURHAM (March 6).—Supply of fluid disinfectant for use in schools in the county area from April 1, 1924, to March 31, 1925, for the Education Committee. Forms of tender may be obtained from Mr. A. J. Dawson, Shire Hall, Durham.

ANDOVER (February 25).—For the supply of lubricating oils during the ensuing six months for the Town Council. Specification may be obtained from Mr. R. W. Knapp, Town Hall, Andover.

Tariff Changes

NETHERLAND EAST INDIES.—Sulphuric acid used for refining petroleum may now be imported duty free.

PERU.—A duty of 40 cts. per 100 kilogs. has been imposed on Portland cement imported through Callao. The proceeds of this duty are to be used for the construction of a hospital, and on completion of the hospital the duty will be withdrawn.

CZECHO-SLOVAKIA.—The following additions have been made to the list of articles not requiring an import licence:—Hydrofluoric acid; borax, refined; bisulphite of sodium in aqueous solution; blanc fixe; white of baryta (artificial sulphate of barium); sulphate of magnesium (Epsom or Seidlitz salts); alum, except chrome alum; sulphate and chloride of alumina; zinc vitriol; and concentrated acetic acid.

GAMBIA.—All miscellaneous import duties have been removed except on certain specified articles, including explosives, tar, pitch, cement, lime, soap, spirits and certain chemicals. Under the new regulations the following duties are now imposed on chemicals:—Calcium carbide, 1d. per lb.; dyes and dyestuffs, 2s. 3d. per lb.; other chemicals, 7½ per cent. *ad valorem*.

BRAZIL.—Alterations recently made in the Customs Tariff include the following revised import duties:—Hexamethylenetetramine, 6,500 Reis per kilog; peroxide of hydrogen, 1,200; acetylsalicylic acid, 3,000; phenylcynchonic acid, 3,000 Reis per kilog.

BULGARIA.—Lead oxide, chromate, and bichromate have been removed from the list of imports prohibited.

URUGUAY.—Products derived from the physical or chemical treatment of bones are liable to an import duty of 10 per cent. *ad valorem*.

Calico Printers and the Proposed Dye Combine

THE Federation of Calico Printers has forwarded a protest to the Board of Trade against the proposed Anglo-German dye combine as foreshadowed in the press, which would, they state, be vitally detrimental to the industry. They also call upon the Board of Trade not to sanction any agreement until colour users in this country have been taken into full consultation in the matter. A request has also been sent to the President of the Board of Trade for him to receive a deputation from the Federation.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

HALL, Harry H., Sladen Dye Works, Littleborough, master dyer. (C.C., 16/2/24.) £23 4s. 6d. December 29.

PEETZ, Michael, 65, Portobello Road, Notting Hill Gate, liquid nail polish manufacturer. (C.C., 16/2/24.) £67 18s. 10d. December 7.

SMITH (W.) AND CO., 52, Mile Street, Sunderland, colour merchants. (C.C., 16/2/24.) £11 8s. January 4.

STUCKEY (W. G.) AND CO., LTD., 17, Down Street, Piccadilly, wholesale chemists. (C.C., 16/2/24.) £19 5s. 10d. January 2.

UNITED LABORATORIES AND CHEMICAL CO., LTD., 97, Queen Victoria Street, E.C. (C.C., 16/2/24.) £13 10s. 6d. November 15.

Receivership

SYDBIE, LTD. (R., 16/2/24.) W. F. Flint, of 11, Serle Street, W.C.2, was appointed receiver and manager by Order of Court dated February 1, 1924.

Bill of Sale

COWAN, William James, 51, Winterbourne Road, Thornton Heath, wholesale chemist. (B.S., 16/2/24.) £125. February 5.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

AUSTAKER MANUFACTURING CO., LTD., Blackpool, chemical manufacturers. (M., 16/2/24.) Registered January 31, £450 debentures; general charge.

CLEMENT AND JOHNSON, LTD., London, W.C., chemists. (M., 16 2 24.) Registered February 1, £200, £200, £200, £200, £100 and £200 debentures, part of £60,000; general charge. *£38,700. January 12, 1923.

GRAYS DYES AND COLOURS, LTD., Huddersfield. (M., 16/2/24.) Registered January 30, agreement securing to United Indigo and Chemical Co., Ltd., Spring Gardens, Manchester, £30,000 (not ex.) advanced by them and interest and a share of profits arising out of a certain transaction; charged on company's share of amount to be received by them from British Alizarine Co., Ltd., in respect of sales of alizarine referred to in agreement. *Nil. May 17, 1923.

HYDROGEN OXYGEN AND PLANT CO., LTD., London, W. (M., 16/2/24.) Registered January 30, £100 second debentures, part of £35,000; general charge. *£54,800. August 8, 1923.

PASTEX DYES, LTD., London, N. (M., 16/2/24.) Registered February 1, £450 debentures, to Service Investment Society, Ltd.; general charge.

London Gazette

Winding-Up Petition

MAGADI SODA CO., LTD. (W.U.P., 16/2/24.) A petition for winding-up has been presented and is to be heard at the Royal Courts of Justice, Strand, London, W.C., on Tuesday, February 19.

Companies Winding Up

THE BRITISH POTASH CO., LTD., 49, Queen Victoria Street, London. (C.W.U., 16/2/24.) Winding up order, February 5.

THE UNITED LABORATORIES AND CHEMICAL CO., LTD., 97, Queen Victoria Street, London. (C.W.U., 16/2/24.) Winding up order, February 5.

Company Winding Up Voluntarily

SIMPLEX POLISH CO., LTD. (C.W.U.V., 16/2/24.) W. G. Hall, Bank Chambers, Silver Street, Hull, incorporated accountant, appointed liquidator. Meeting of creditors at the office of the liquidator on February 23, at 11 a.m. Creditors' claims by March 22.

Bankruptcy Information

SANDAY, Marcus Beresford, 1, Brigstocke Terrace, 1, St. Thomas' Street, and 3, 4 and 5, Royal Victoria Arcade, all in Ryde, Isle of Wight, perfume manufacturer. (R.O., 16/2/24.) Receiving order, February 6. Creditor's petition.

Partnership Dissolved

WHITLEY AND CO. (Vincent Affleck WHITLEY and George WIGNALL), oil and produce merchants and manufacturers of extract of annatto, 36, Russell Road, Barnes Green, Blackley, by mutual consent as from January 31, 1924. Debts received and paid by V. A. Whitley.

New Companies Registered

ABRADO, LTD., 638, Salisbury House, London Wall, E.C. Crushers, graders and merchants of abrasives and other materials, dealers in silica, carbide and other abrasive materials, etc. Nominal capital, £1,000 in £1 shares.

COLOURED ASPHALTE CO., LTD., 1, Bull Street, Burnley. Manufacturers of and dealers and workers in natural, coloured and synthetic asphalte, minerals, etc. Nominal capital, £6,000 in £1 shares.

DIXON & SWANN, LTD., 196, Deansgate, Manchester. Colour manufacturers and merchants. Nominal capital, £1,000 in £1 shares.

ENGLISH ARSENIC CO., LTD. Raisers, buyers, crushers, washers, concentrators and metallurgical treaters of arsenical and other kinds of ores, metals and minerals, etc. Nominal capital, £2,500 in £1 shares. A director: E. J. Nicholas, Broad Street House, New Broad Street, London.

GARTON, SONS, & CO. Starch manufacturers, chemists, brewers, etc. Nominal capital, £500,000 in £1 shares. Solicitors: E. Flux-Leadbetter & Neighbour, 88, Gracechurch Street, London, E.C.

S. HUBBARD, LTD., Regent Street Dyeworks, Luton. Bleachers and dyers, manufacturers of and dealers in oils, dyes, barium, hydrogen peroxide and all kinds of chemicals and ingredients capable of being used in bleaching and dyeing. Nominal capital, £60,000 in £1 shares.

MANDER BROTHERS, LTD., St. John's Street, Wolverhampton. Varnish, colour, paint and printing ink manufacturers. Nominal capital, £600,000 in £1 shares (175,000 7 per cent. first cumulative preference, with priority also as to capital).

MEXCO, LTD., Caledonian Chambers, 102, St. Mary Street, Cardiff. Manufacturing and operating chemists, manufacturers and importers of and dealers in all kinds of salts, acids, alkalis, drugs, medicines, chemical materials and scientific instruments; manufacturers of explosives, gunpowder, nitroglycerine, etc. Nominal capital, £15,375 in 15,000 "A" shares of £1 each and 7,500 "B" shares of 1s. each.

RODOVUS, LTD. Manufacturing chemists. Nominal capital, £1,000 in £1 shares. A director: J. N. Strong, 67, Thurlow Park Road, S.E.21.

Recent Wills

Mr. William Aspden, of Morcambe, Lancs, chemical and manure manufacturer	£13,343
Mr. Charles Edwin Hall, of Didsbury, Lancs, formerly in business as a dyer	£14,920